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DEVELOPMENTS IN EXECUTIVE INFORMATION SYSTEMS



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Information Systems Program (ISP)

Developments In Executive Information Systems

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Abstract

This report examines the progress being made in the implementation and the market direction of Executive Information Systems (EIS).

The concept of adapting information technology for the benefit of senior managers has begun to be put to use. Drawing on the power and ease of use of the personal computer and the flexibility of relational data base technology software, a growing number of vendors have created development tool kits that facilitate the creation of EIS applications.

In this report INPUT provides an analysis of the underlying concepts and technology; an in-depth profile of progress within the user and information systems community of larger organizations; and an assessment of the market, its vendors, and its size and growth rate. INPUT found significant progress, a greatly expanding vendor community, and a market that may provide significant indicators for applications development in general during the first half of the 1990s.

For organizations that undertake it, EIS development may be a journey that leads to a number of new opportunities to benefit from the already existing investment in information systems.

The report has 136 pages and 66 exhibits.



Table of Contents

I	Introduction	1
	A. Objectives	1
	B. Methodology and Scope	2
	1. Methodology	2
	2. Scope	5
	C. Report Structure	5
	D. Related INPUT Reports	6

II	Executive Overview	7
	A. Background and Methodology	7
	1. Reasons for the Study	7
	2. Methodology and Scope	8
	3. Demographics	9
	B. EIS—Past and Future	9
	1. Prior to 1990	9
	2. EIS—A Definition	12
	3. After 1990	13
	C. The User View	14
	1. Activity and Status	14
	2. The EIS Sponsor	16
	3. EIS Commandments	17
	D. The Vendor View	19
	1. Market Structure	19
	2. Vendor Direction	21
	3. Market Forecast	22
	E. Conclusion and Recommendations	23

III	EIS—Past and Future	25
	A. Prior to 1990	25
	1. Foundation	25
	2. Breaking New Ground	27
	3. Stages of Evolution	28



Table of Contents (Continued)

III	B. EIS—A Definition	30
	1. What Is an Executive Information System?	31
	a. Application or Tool Kit	31
	b. EIS Components	32
	c. A Pictorial Definition	34
	2. EIS Compared to Traditional Applications	35
	3. EIS Impacts on Applications Development	37
	C. After 1990	39

IV	The User View	41
	A. Demographics	41
	B. Status and Activity	42
	1. EIS Activity Level	42
	2. EIS Characteristics	48
	3. EIS Development	55
	a. Sponsorship and Support	55
	b. Development Effort	61
	c. Abandoned EIS Efforts	64
	4. EIS Performance	65
	C. Lessons Learned	68
	1. EIS Development Cycle	69
	2. The EIS Commandments	71
	D. Planning for the Next Wave	74
	E. The Value of EIS	76
	1. For the Organization	76
	2. For Information Systems	77

V	The Vendor View	79
	A. Market Structure	79
	1. Market Evolution	80
	2. Approach to the Market	82
	3. Pricing and Buying Patterns	84
	4. Role of Professional Services	88
	a. Vendor Involvement	88
	b. Vendor Philosophies	90
	i. Major Professional Services Firms	90
	ii. Primary EIS Software Vendors	91
	iii. Decision Support Vendors	91
	iv. EIS Tool Kit Vendors	91
	c. Importance to Market	92



Table of Contents (Continued)

V	B. Key Software Vendors	92
	1. Profiles	92
	a. American Information Systems	93
	b. Comshare	93
	c. Decision Technologies	94
	d. Execucom	94
	e. Holistic Systems	95
	f. Information Builders Inc. (IBI)	95
	g. Information Resources Inc. (IRI)	96
	h. Interactive Images	97
	i. IBM	97
	j. Media Works	98
	k. Pilot Executive Software	98
	l. SAS Institute	99
	2. How Vendors Are Changing	99
	3. Summary	100
	C. The Changing Market	102
	1. Market Issues	102
	2. Technology Trends	104
	3. Competitive Issues	106
	D. Market Forecast	108
	1. Market Share and Penetration	108
	2. Market Forecast, 1990-1995	110
	3. Summary	112

VI	Conclusions and Recommendations	115
	A. Conclusions	115
	1. Market	115
	2. Technology	117
	3. Application of EIS Technology	118
	4. The Future	118
	B. Recommendations	119
	1. For Users	119
	2. For Vendors	121
	C. Closing Thoughts	122

Appendixes	A Appendix: EIS User Questionnaire	123
	B Appendix: EIS Vendor Questionnaire	129
	C Appendix: Vendors Interviewed	135



Exhibits

I	-1 Demographics of User Organizations—Industry Segmentation	3
	-2 Demographics of User Organizations—Revenue Size	4
	-3 Demographics of User Organizations—Size of IS Budget	4

II	-1 Business Systems Workstation Market—The Opportunity	8
	-2 Breaking New Ground with EIS	10
	-3 Evolution of EIS Technology	11
	-4 EIS Definition—Tool Kit Components	12
	-5 EIS Activity and Status	14
	-6 EIS Subapplications and Categories of Data	15
	-7 Sponsors' Goals	17
	-8 The EIS Commandments	18
	-9 EIS Market Evolution—Types of Software Vendors	19
	-10 Competitive Issues	20
	-11 EIS Software Vendors—Classification and Direction	21
	-12 EIS Market Forecast, 1990-1995	22
	-13 Recommendations	24

III	-1 EIS Technical Foundation	26
	-2 Breaking New Ground with EIS	27
	-3 Stages of EIS Evolution	29
	-4 Evolution of EIS Technology and Its Use	30
	-5 EIS Definition—Tool Kit Components	33
	-6 EIS—A Pictorial Definition	34
	-7 EIS and Traditional Application Systems—Key Differences	36
	-8 EIS Impacts on Application Development	37
	-9 Future EIS Characteristics—Three Dimensions	39

IV	-1 EIS Activity and Status	43
	-2 Number of Active EIS Applications	44
	-3 Size of EIS User Population	45
	-4 Who Uses EIS—Installed Systems	46
	-5 Areas Where EIS Used—Active and Planned	48



Exhibits (Continued)

IV

-6	Number of EIS Subapplications	49
-7	EIS Subapplications—Active and Planned	51
-8	Categories of Data Included—Active and Planned	53
-9	EIS Hardware Environment	54
-10	Who Is the EIS Sponsor?	56
-11	Sponsor's Goals	57
-12	Project Leadership and Support	59
-13	Size of EIS Support Staff	60
-14	Support Costs of EIS—Staff Costs	61
-15	EIS Development Time	62
-16	Cost of EIS—Initial Investment	64
-17	Analysis of Abandoned EIS Projects	66
-18	EIS Performance Level—User Evaluation	67
-19	EIS Performance Level—IS Evaluation	68
-20	EIS Development Cycle—Time to Perform	70
-21	The EIS Commandments	72
-22	EIS Development Considerations	74
-23	The Value of EIS	76

V

-1	EIS Market Evolution—Types of Software Vendors	80
-2	EIS Market Evolution—Vendor Entry	81
-3	EIS Market Structure—Product Strategy Comparison	83
-4	EIS Market Structure—Services Strategy Comparison	84
-5	EIS Pricing by Software Vendors	85
-6	EIS Software Costs	87
-7	Professional Services Involvement—Using Professional Services	89
-8	Professional Services Involvement—Performing EIS Development Tasks	90
-9	EIS Software Vendors—Classification and Direction	100
-10	EIS Key Vendors Summary	101
-11	EIS Market Issues	102
-12	EIS Technology Trends	104
-13	Competitive Issues	106
-14	Developing EIS—Software Used	109
-15	EIS Market Forecast, 1990-1995	111
-16	EIS Market Forecast—Key Factors	112

VI

-1	Conclusions	116
-2	Recommendations	120

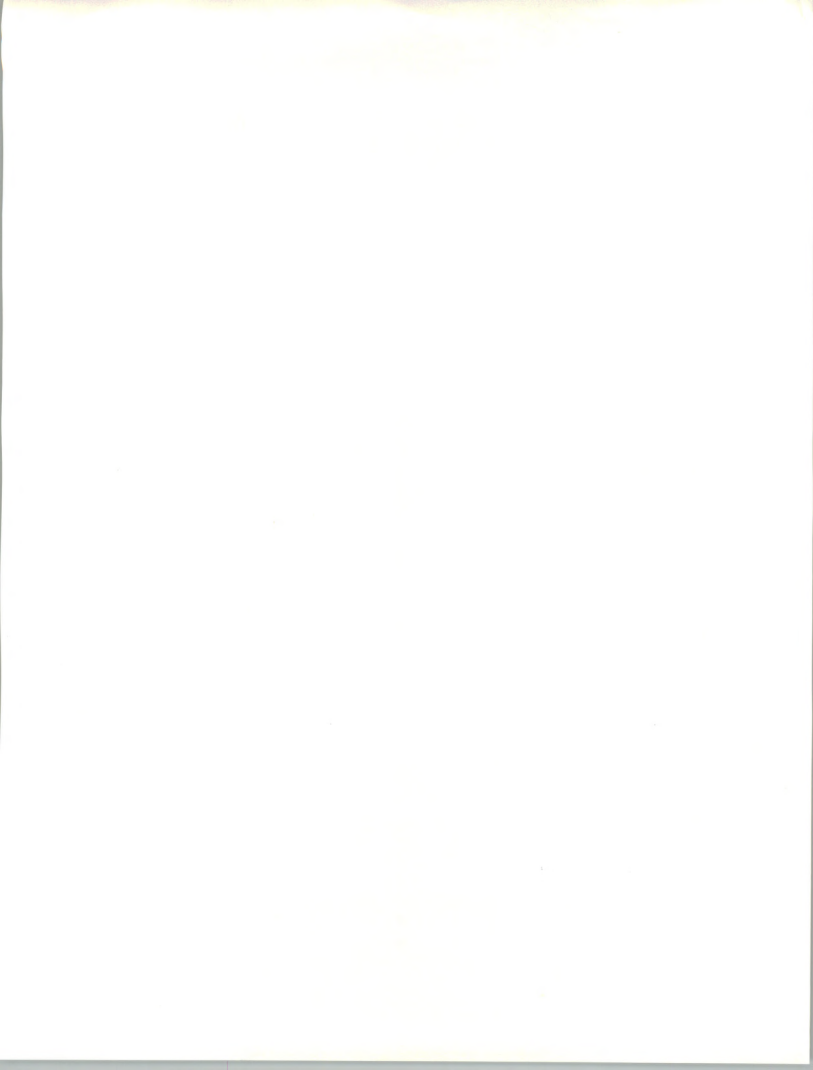






Introduction







Introduction

Executive Information Systems (EIS) became a recognized market and application in about 1985, with the introduction of Command Center by Pilot Executive Software, followed shortly by Commander/EIS from Comshare. However, using the computer to provide information and management decision support to executives goes back to the mid-1970s or before. During this study, EIS systems that predate the early 1980s were identified.

Though EIS is officially five years old, the start of the 1990s will prove to be a point of new beginning for EIS technology and use. EIS technology is rapidly changing, its use is quickly spreading, vendor-provided alternatives are now numerous and quite varied, the technology is setting examples for traditional application systems, and management at all levels is asking for EIS. The pace of business decisions increased in the 1980s, and the idea that information technology can lead to competitive advantage became common. The growing use of EIS is one of the specific results.

The intent of this report is to examine the EIS phenomenon by taking a snapshot of its status from both the user and vendor points of view. The report also provides a framework for capturing, to the fullest, the benefits that the use of EIS technology offers.

A Objectives

This study of Executive Information Systems has the following major objectives:

- To examine the current level of implementation of and satisfaction with EIS.
- To characterize EIS systems: what applications do they contain, who uses them, and what is their life cycle?



- To describe the EIS software and services market, identify the underlying trends and interpret vendor directions for existing and future users of EIS technology
- To forecast the size of the EIS market and expected growth for 1990-1995
- To forecast the major considerations that users and vendors must address to derive maximum value from EIS capabilities in the early 1990s

B

Methodology and Scope

1. Methodology

The results presented in this report are based on three surveys as well as extensive secondary research. The surveys were:

1. A mail survey conducted by INPUT and the Profit Oriented Systems Planning Program (POSPP), a major association of Chief Information Officers and their management. The questionnaire is included as Appendix A. A total of 126 completed questionnaires were returned with responses ranging from *multiple EIS systems installed to no current plans*. INPUT would like to acknowledge POSPP and its membership for its contribution to and management of the survey.
2. An additional twenty telephone interviews conducted with users of EIS systems. These interviews were in depth, often lasting thirty minutes or more. They explored the issues and questions on a qualitative basis. All the interviewers had operational EIS systems at the installed or prototype stage.
3. In-depth telephone interviews with sixteen software and/or professional services vendors. Included are the leaders in the EIS market, recent additions to the market, three major professional services firms with EIS practices, and two major software vendors becoming active in the EIS market. The questionnaire used is included as Appendix B. These interviews typically lasted forty-five minutes and were with the executive or marketing manager responsible for EIS strategy. The vendors interviewed are listed in Appendix C.

The large response to the mail survey provides INPUT with extensive quantitative results that are presented in Chapter IV and throughout the report. The sample size allows INPUT to present a solid and complete picture of EIS activity.

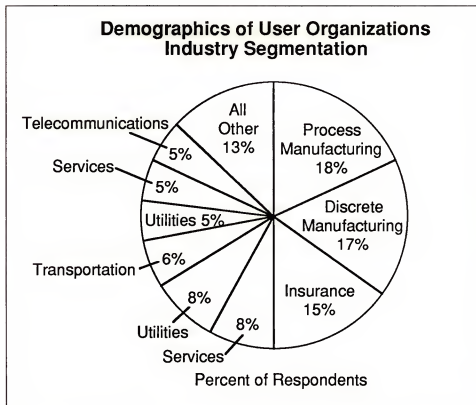


In addition to the survey and interviews, this report utilizes information from several previous INPUT reports, in particular those listed in Section D of this chapter.

The user organizations participating in the mail survey represent a broad range of industries and size of organizations. The following exhibits provide the demographics of the user survey respondents.

- The responses included at least one response from each of the industry segments used by INPUT except the federal government. The industries with 5% or more of the responses are shown in Exhibit I-1.

EXHIBIT I-1



- Exhibit I-2 shows the population by revenue. The organizations surveyed are predominantly in the Fortune 500 class.
- The distribution of respondents by size of IS budget, shown in Exhibit I-3, is evenly spread from small (under \$5 million) to very large (over \$500 million). Many of the larger respondents had smaller IS budgets because the response was from the corporate IS group within a decentralized IS structure.



EXHIBIT I-2

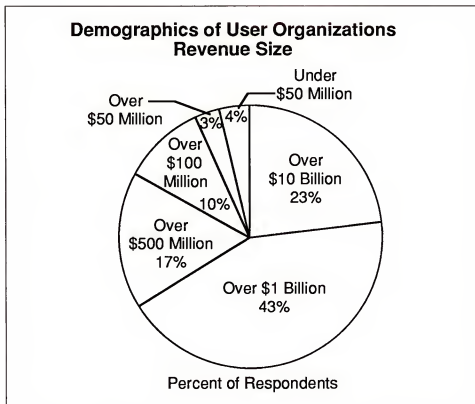
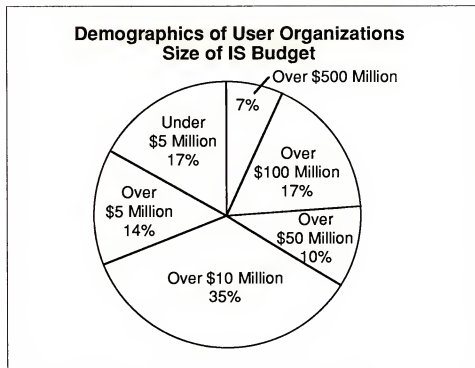


EXHIBIT I-3





The demographics of the survey represent a cross-section of the current EIS-type software products and services market. Where possible, differences in EIS activity were determined by industry and/or revenue size and are reported in Chapter IV.

2. Scope

The research and analysis in this report focuses on the state of EIS as an application and software technology. The level of use and maturity are analyzed, the vendor community studied, and the implications of EIS discussed.

The report does not deal in-depth with the EIS development and implementation process. That subject is dealt with by several excellent books and is typically well supported by advice from the software vendor. This report identifies critical factors about the successful installation of an EIS, as well as provides a framework for selecting from the growing number of software alternatives.

C

Report Structure

The following is a brief description of the organization of this report:

- Chapter II is an Executive Overview providing a summary of the research findings, analysis, conclusions, and recommendations of the report.
- Chapter III, *EIS—Past and Future*, is a conceptual, philosophical, and applied framework for understanding the Executive Information Systems phenomenon.
- Chapter IV, *The User View*, reports the findings and analysis of the mail survey, and provides a framework for undertaking the EIS task.
- Chapter V, *The Vendor View*, presents the market structure, the size of the EIS market, and how it is being served by the vendor community. Key vendors are identified, trends discussed, and a market forecast presented.
- Chapter VI, *Conclusions and Recommendations*, gives INPUT's conclusions and recommendations for users and vendors involved in the EIS process.
- Appendixes A and B contain the questionnaires used in gathering the data presented in this report.
- Appendix C lists the vendors interviewed.



D**Related INPUT
Reports**

Recent INPUT reports of direct relevance to this study include:

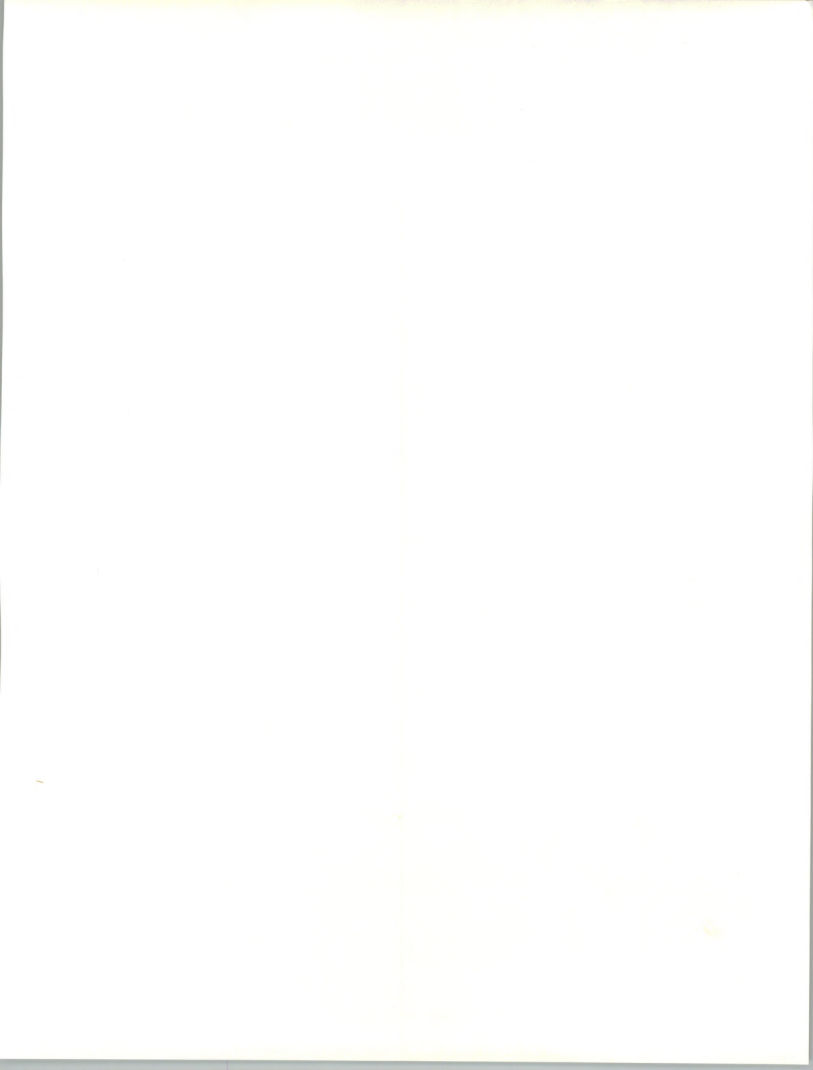
- *The Future of Information Systems Management*, 1989
- *Developments in End-User Computing*, 1989
- *Workstation Strategies*, 1988
- *U.S. Software Products Market*, 1989-1994
- *U.S. Professional Services Market*, 1989-1994
- *PC Software Market*, 1989-1994





Executive Overview







Executive Overview

This study focuses on the recent phenomenon of providing information systems that directly support executives. The Executive Information System (EIS) is a late-1980s application that draws on computing technology that combines the ease of use of the PC with the integration provided by today's information networks.

The research INPUT conducted was directed at the following objectives:

- Examine the current level of implementation of and satisfaction with EIS
- Characterize EIS systems, what applications they contain, who uses them, and their life cycles
- Describe the EIS software and services market, identify the underlying trends, and interpret the vendor directions for existing and future users of EIS technology
- Forecast the size of the EIS market
- Identify the major considerations that users and vendors will need to address to obtain maximum value from EIS capabilities in the early 1990s

A

Background and Methodology

1. Reasons for the Study

The motivation for this research was based on the recognition that EIS has reached an initial level of success. In addition, the application of EIS software technology was beginning to penetrate a large user base both at the top of the user organization and downward to middle management. Finally, the number of EIS vendors has greatly increased in the last two years, suggesting a growing market opportunity.



- From its early use by a limited number of executives, EIS is now used by numerous executives, marking the creation of a new category of end users—senior management.
- The technology has led the way in the integration of workstation (PC) and relational data base technology. In many ways, EIS is the first example of true cooperative processing.
- EIS has provided opportunities for professional services firms as well as numerous software developers, as they open a new market sector.
- EIS has become one way for senior executives to learn about and drive the use of information technology within their organizations. Certainly, this is one of the key tasks of today's business leader, and in this instance executives also directly benefit from EIS use.

All of this suggests there is more to EIS than just placing a few PCs on the desktops of executives. It is in fact the first common example of using the workstation as the "window to the information network," a concept first described by INPUT in its 1987-1988 report series, *Workstation Strategies*, and depicted in Exhibit II-1.

EXHIBIT II-1

Business Systems Workstation Market The Opportunity

- Sell more-expensive workstations
- Sell higher-priced workstation software
- Add immense processing power to the network
- Provide increased processing power to the user
- Move computing to a truly graphic mode
- Move development and processing to the end user

2. Methodology and Scope

The primary research for this report consisted of:

- A mail survey of 126 larger organizations concerning their progress with Executive Information Systems
- In-depth telephone interviews with the project leaders of twenty current EIS implementation efforts



- In-depth interviews with sixteen vendors currently active in the EIS market. Included were the creators of the EIS software market (Comshare and Pilot Executive Software), four professional services firms with active EIS practices, and essentially all the software companies currently marketing an EIS development tool kit.

This report focuses on the progress being made with EIS, the status of the market and technology, and the underlying trends, issues, and implications for information systems. The report is not intended to be a cookbook on how to develop an EIS.

3. Demographics

The companies surveyed were members of the Fortune 500 market and represent most of the common industry segments. Only the government (federal, state, and local) segments were not adequately represented. The majority of the companies (83%) had revenues in excess of \$500 million.

The individuals completing the mail questionnaire were primarily members of corporate information systems. Over 50% were at the director or vice president level and 15% were in user organizations.

The survey provides a solid representation of EIS activity within Fortune 500-type organizations within the United States.

B

EIS—Past and Future 1. Prior to 1990

EIS has had a relatively short life; it first took shape as a product and application in 1985. In five years the underlying technology has gone through significant evolution, and the user community has begun to adopt EIS in significant numbers.

EIS has its foundation in four key trends of the early 1980s, the era during which end-user computing took shape. The adoption of fourth-generation languages, the use of specialized 4GLs to develop decision support systems, the explosion of personal computing, and the emergence of relational data base management systems provided an environment for the creation of the first EIS software products.

In Exhibit II-2, INPUT characterizes the EIS technology evolution as one of *breaking new ground*. EIS has provided the opportunity to move application systems into a new world characterized by:

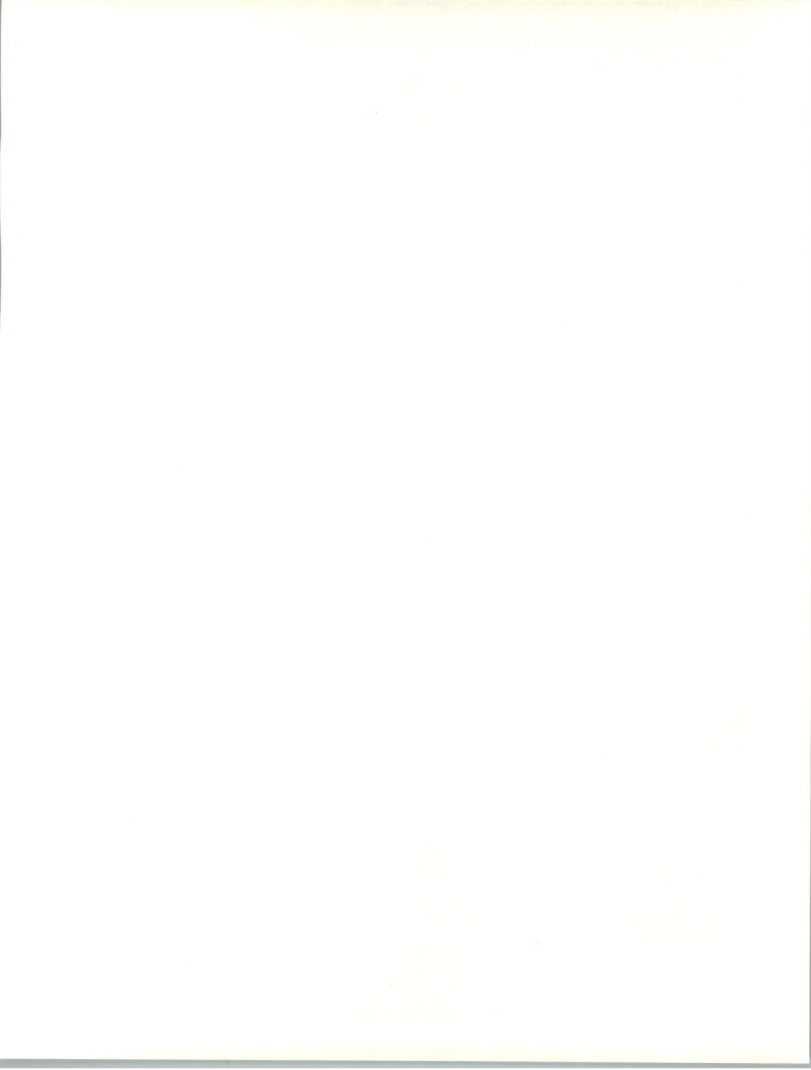


EXHIBIT II-2

Breaking New Ground with EIS

1. New Category of User
2. Relational Data Base Management Systems
3. Information versus Data
4. Graphical User Interface
5. Integration of Personal Productivity Tools
6. Cooperative Processing

- A new category of users—senior and upper management
- An early and valuable use of relational data base technology
- A shift from focusing on collections of data to the use of information for critical business decisions
- A proving ground for the use of graphical as opposed to character-based user interfaces
- The creation of an environment in which a mostly illiterate computer user begins to use a PC for several tasks
- One of the first common implementations of cooperative processing concepts

IS organizations now undertaking the EIS journey need to stand back and look at the technology for what it can do. It certainly helps achieve the longstanding and seldom-achieved goal of serving senior executives. Equally important, the use of EIS technology teaches IS departments new ways to deliver application systems that enhance their value to the organization.

Exhibit II-3 provides a simplified look at the phases through which EIS has, and will, pass in a short ten-year timespan. The exhibit describes three stages of evolution: from an application to a specialized development tool kit and, in the next five years, to a generalized development tool kit.



EXHIBIT II-3

Evolution of EIS Technology

	1985	1990	1995
Development System	Application system product	Special-purpose development tool kit	General-purpose development tool kit
Frequency of Use	One application	Some applications	Many applications
Type of User	Select executives	Executives and managers	All levels of management

- EIS software began as an application designed to summarize existing data and store them in a specialized data base that supported on-demand queries from the user. The goal was to turn data into information and make it available on demand in character and then graphical form. This was accomplished by linking the power of a relational data base on a host to the ease-of-use and presentation capabilities of the personal computer. Users tended to be adventuresome senior executives.
- Modest success brought enough vendors into the market to drive added capabilities into the EIS product. Now, in addition to yielding specialized information, EIS has become the executive's interface to E-mail, a variety of personal job aides, and external data services. The development and implementation tasks have expanded and the EIS software product has become a tool kit rather than an application. The price has gone up and the market has broadened.
- Looking out five more years, INPUT sees the term *EIS* returning to its intended application orientation—an information system designed to help managers run their businesses. However, EIS technology will now be applied to all levels of management; EIS applications will be built without an EIS tool kit. The EIS tool kit vendors will have turned their products into generalized development tool kits used to build cooperative processing applications that primarily use data from other applications.

EIS and the underlying user interface concepts are defining a new approach for the applications of the 1990s.



2. EIS—A Definition

Because of the broadening content of EIS software products, providing a concise definition of an Executive Information System is a challenge.

- The user (IS and the actual user) still regards EIS as an application. Users recognize that EIS is created rather than implemented, like an accounting package. However, the result is still an application that provides a variety of information (internal and external) to its user.
- The vendor community, on the other hand, in its goal to expand the market and compete, is constantly broadening the definition of EIS. Vendors have arrived at the EIS tool kit through the usual competitive process. The vendor community has grown to about a dozen serious software vendors who bring a wide variety of orientations to their EIS products.

Exhibit II-4 provides a picture of the evolution and expansion of EIS software technology.

EXHIBIT II-4

EIS Definition—Tool Kit Components

Component	Original	Current	Future
Relational Data Bases	X	X	X
Character User Interface	X		
Graphical User Interface	X	X	X
Personal Use Tools		X	X
CASE-like Development Tools		X	X
Direct Data Pipeline - Import & Export		X	X
Decision Support Tools			X
Text Management			X
Image Processing			X



The original technology supported the application definition. The current components describe the general capabilities in most current vendor offerings, and the future presents the capabilities to be added over the next few years.

- To meet the original objective of turning existing data into information for the executive, little was needed besides specialized data staging and presentation capabilities. The initial systems did this, and as soon as they provided PC graphical interface capabilities, the race was on.
- However, once there was competition, the tool kit expanded. The desire for more timely (weekly and daily) information is making the interface to operational data bases (the data pipeline) a critical element. The PC champions have decided that the executive needs a computerized calendar, E-mail, external news service, and more, and now there are CASE-like development tools.
- As the variety of information expands, the interest in using EIS applications naturally expands downward into the organization to operating and middle management. A broader user base will add to the capabilities required, including the need to move EIS information into spreadsheets, more powerful DSS tools, expanded use of text processing, and access to image data bases as they become operational.

3. After 1990

Certainly, when all these factors are considered, the EIS definition has shifted to a generalized tool kit used to define an interface to all types of information from internal and external data sources. Although EIS technology may not replace the common user interface for data input and collection, it will impact the reporting and presentation of operational systems. In addition, it will continue to expand into a new family of information presentation and analysis applications.

The use of EIS and EIS technology itself can be expected to expand in three directions.

- The types of users will increase by moving down into the organization.
- The types of applications will expand across the organization.
- The number of users will grow significantly.



C

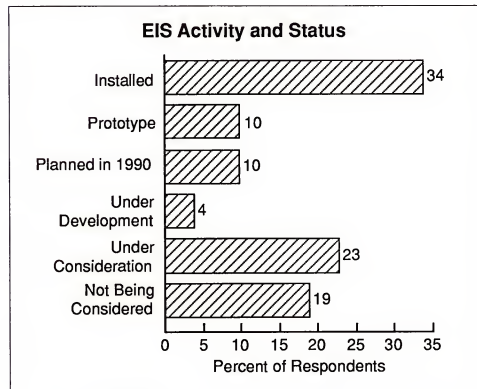
The User View

The extensive mail survey has permitted INPUT to analyze the current level and nature of EIS activity in detail within large organizations. That analysis is presented in detail in Chapter IV of this report. A few highlights are presented here.

1. Activity and Status

INPUT found a very high activity level among the respondents to the survey. As Exhibit II-5 shows, just over one-third indicated that they had at least one installed EIS, while another 23% had EIS in the prototype or development stages.

EXHIBIT II-5



- Only 19% indicated they did not have an EIS under consideration. The reason was primarily the lack of a sponsor. INPUT suggests that EIS technology and activity is mature enough that IS can undertake the sponsorship process, perhaps at a level below the senior executives and within a specific functional area.
- It was also very common to have more than one EIS installed; 43% of the respondents had more than one, and the number ranged to 10.
- Many—perhaps a majority—of those having an installed system also had additional systems under development. The value of EIS is catching on.

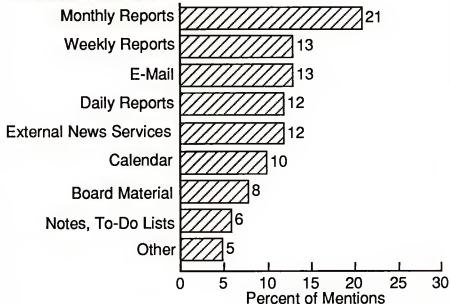


Exhibit II-6 gives two pictures of the content of installed EISs: first, the subapplications and second, the categories of data that are commonly included.

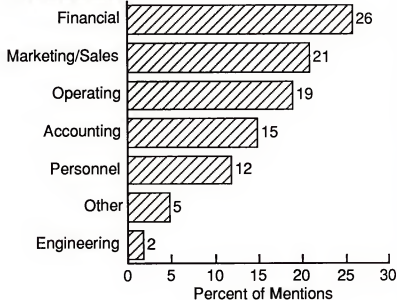
EXHIBIT II-6

EIS Subapplications and Categories of Data

EIS Subapplications



Area of EIS Use





- The number of subapplications ranged from one to eight and in 70% of the instances included three or more.
- The variety of subapplications is shown in the first chart in Exhibit II-6.
 - Together, the Monthly, Weekly, and Daily Report categories are the most common. However, INPUT recommends that these categories be considered unique applications. The data pipeline, the activity and style of use, and the presentation of the information are all likely to be different.
 - The other category included specialized subapplications such as competitive information, litigation tracking, and economic model output.
- Not surprisingly, the categories of data emphasize finance and accounting. These categories are the principle providers of information for senior management. However, the common inclusion of marketing, operations, and personnel data suggests the breadth EIS has achieved.
 - To get weekly and, in particular, daily information, the EIS must turn to the operating systems of the business or business units, not the financial consolidation and reporting systems.
 - The presence of personnel data supports the growing attention being paid by senior management to a critical asset—the employees.

2. The EIS Sponsor

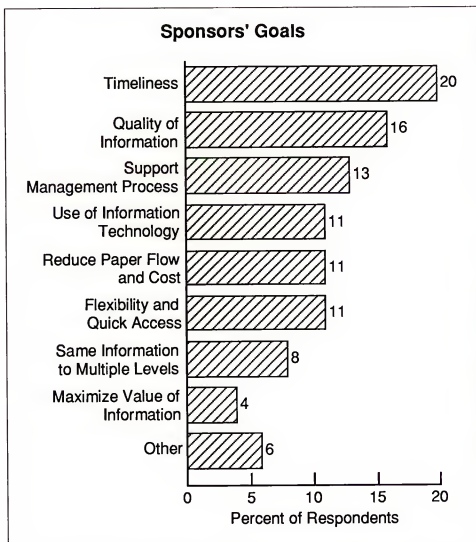
Unlike most new information systems efforts, the EIS effort has been driven by the user, in particular senior management. EIS has become an example of how senior managers can increase the use of information technology within their organizations; EIS is an indicator of successful management in the late 1980s and has benefited many of the executives who have ventured to implement EIS technology.

The EIS party line has been, “Don’t undertake the journey unless there is top-down senior sponsorship”—preferably the president or a member of his/her staff. INPUT’s research confirmed this belief to a degree, but also indicated that the IS executive is beginning to take on the sponsorship responsibility. In one-third of the responding organizations, the IS executive was the original sponsor of the EIS activity.

More important are the goals of the sponsors. Exhibit II-7 presents an analysis of the goals indicated (each respondent was asked to list three goals).



EXHIBIT II-7



- In general the goals are simplistic statements about running the organization better. The three most commonly mentioned goals (representing 49% of the mentions) all fit this description.
- The fourth goal, use of information technology, is the only one that explicitly states the need for changing how the organization operates.

There is a strong belief that EIS is a tool that supports today's movement toward flatter organizations. The EIS channels and speeds the information flow, allowing senior managers to direct a wider diversity and number of functions or business units.

3. EIS Commandments

There are many factors that make the development and use of EIS different from that of traditional application systems or end-user computing. EIS in fact joins the two ends of the IS spectrum.



In Exhibit II-8, INPUT has identified ten rules, laws, or guidelines about EIS that everyone involved must remember and follow. These ten commandments help define the systems objective addressed by EIS.

EXHIBIT II-8

The EIS Commandments

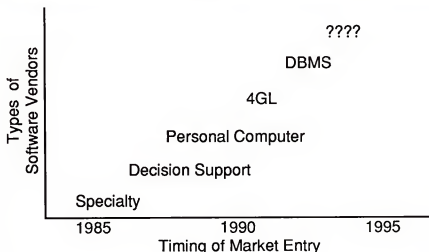
1. The most important users are those who provide the information and support data ownership.
2. Involve the users' administrative aide—create an inside ally.
3. Flexibility is the law—for user, developer, information provider.
4. EIS must be the fastest way to get the information, but must also provide a paper version.
5. EIS provides value-added information and must include text and comments.
6. EIS will expose weaknesses in the existing information network—be prepared to fix them.
7. Put the full underlying technology on the desktop the first time—only one chance to train the executive.
8. Do not charge-back EIS—this is not a cost-justified application.
9. EIS implementation is a journey without an end, but you must set a course.
10. EIS technology will change the face of end-user computing—information systems should get on with it.



D**The Vendor View****1. Market Structure**

The EIS market has changed significantly over the past five years. As shown in Exhibit II-9, the software vendors participating in the market have diversified significantly.

EXHIBIT II-9

EIS Market Evolution—Types of Software Vendors

- The EIS trend was started by two specialty vendors, Comshare and Pilot Executive Software, which remain the leading vendors of EIS.
- Since 1987, about ten software vendors have released or announced EIS tool kits. These vendors have several product orientations: decision support, personal computer software, 4GLs, and data bases. Each vendor has brought its own definition, focus and strategy.

The result is a variety of competitive positions and numerous choices for the buyer of EIS capabilities. For example, the 4GL vendor is trying to leverage an existing host-oriented installed base. The PC vendor, on the other hand, is trying to find another access point to the corporate market and the opportunity to provide a higher value-added product (only one vendor currently offers EIS capabilities at a PC price—American Information Systems, for under \$1,500).

In addition to the growing number of active EIS software vendors, the professional services community is focusing on EIS as a source of new business and market differentiation. All have had decision-support-oriented practices and they love to sell to the top of the organization.



What better opportunity than to sell a computing capability for the executive office? It can only lead to the need to improve underlying operational systems.

- INPUT found EIS projects costing over \$1 million, often including the participation of professional services vendors.
- As with the software industry in general, those marketing EIS tool kits are expanding their revenues through the sale of consulting services.

These differing orientations lead to several significant competitive issues, listed in Exhibit II-10.

EXHIBIT II-10

Competitive Issues

- Technical flexibility
- Data access capabilities
- Decision support systems link
- Object orientation
- Fitting into the internal IS network
- Broadening the EIS audience
- User-specific applications (e.g., Human Resources)

- The truly successful EIS software vendor will have to respond to the following technology issues:
 - Flexibility through expanded platforms and data access capabilities. The typical EIS will soon be LAN-based and must be able to interact directly with operational data bases.
 - The EIS tool kit will soon add true decision support analytical tools to the available options and will begin to use object-oriented computing (e.g., the results of a standard query will generate additional queries based on the results found). The vendors that first provide these capabilities will gain a market advantage.



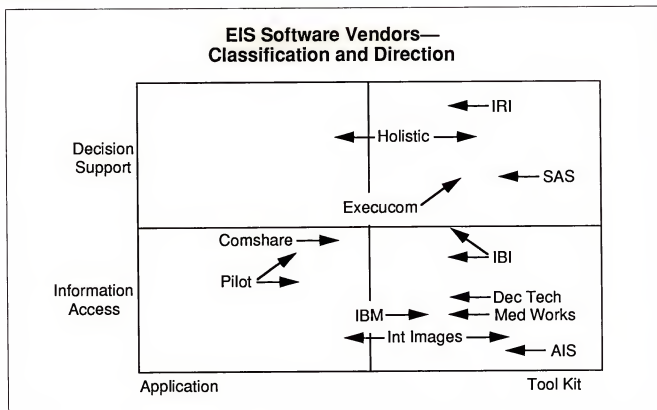
- Another key competitive issue is how the EIS specialty vendors deal with the evolution toward a more generalized tool kit. Vendors may have to shift to another name for their tool kits to compete in a more crowded market.
- As EIS use spreads across and down to lower levels of management, the EIS vendor is faced with serving a more diverse user base. One response may be the creation of function-specific EIS applications, as Comshare has done with Commander HRD (for human resources) and Commander FDC (for financial reporting).

As EIS use expands, it will continue to lose its uniqueness. One way to keep the EIS identification may be to return EIS products to their applications roots and call the tool kits something else.

2. Vendor Direction

The diversity of orientation and direction of the software vendors is pictured in Exhibit II-11. By positioning the vendors and their respective products against an application versus tool kit, and information access versus decision support matrix, a clearer understanding of vendors' goals and strategies can be gained.

EXHIBIT II-11





Such understanding is certainly important for the competitors, but it is equally important for the buyer of an EIS. It can help predict how serious the individual vendor is, how the product should evolve, and how the internal effort and issues should be faced in the implementation process.

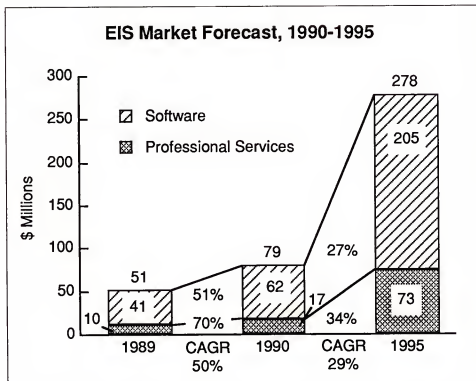
- The positioning of Interactive Images in Exhibit II-11 reflects its real goal in selling EASEL—to provide PC-based interfaces to all types of applications. Interactive Images' Manager's Portfolio is a means to an end, not an end in itself.
- The recently announced entry of Information Builders' Focus/EIS is a recognition by a 4GL and DBMS vendor that EIS is a serious market. IBI may lose some of its control of end-user computing if it does not participate in the EIS market. Certainly as EIS moves down the organization it is both a threat and an opportunity for IBI.

3. Market Forecast

The U.S. market for EIS reached about \$50 million in 1989, including the directly related professional services revenue. And at least one of the leading EIS vendors reports international revenues from EIS equal to those from the U.S. market. The growth rate is strong—approximately 50% in 1990—and can be projected to stay strong for some time.

Exhibit II-12 provides INPUT's 1990-1995 forecast for the U.S. EIS market.

EXHIBIT II-12





It will grow over 50% in 1990 for software and professional services combined, and will show a CAGR of 29% through 1995, when the total market will approach \$278 million.

Factors that may affect this forecast include:

- A blurring of the EIS identity. By the end of the 1990-1995 period, EIS tool kits as sold today will have changed significantly and may not even be called EIS. At that point the EIS tool kit will be competing in a larger cooperative processing software market.
- The role of professional services will continue to expand for the near term, growing much faster than EIS software. In addition, the drag-along professional services revenue from related but non-EIS projects will probably exceed EIS-only revenue.
- The price of EIS software is expected to decline as the emphasis shifts to LAN-based products. Lower prices will be offset by many companies buying multiple tool kits for use in multiple user communities.

E

Conclusions and Recommendations

The EIS market is now definite and established; EIS is part of active information systems programs in a majority of larger organizations. INPUT's recommendations to users and vendors are listed in Exhibit II-13.

If there is a single overall conclusion, it is that EIS can be defined in several ways. Even the simplest definition has many implications for the use of information technology in business. EIS is:

- Putting a new face on application systems
- Teaching about cooperative processing
- Leveraging the existing information asset
- Adding to the end-user computing population

Users who are not pursuing EIS use need to do so now. Vendors not directly involved in the EIS market need to consider it carefully.



EXHIBIT II-13

Recommendations*For Users*

1. Start the EIS journey if it is not underway.
2. IS should assume the leadership and seek sponsors.
3. Recognize that underlying EIS is an information technology of broad value.
4. Understand that there is much to be learned during the EIS journey.
5. EIS is different; be willing to ask for assistance.
6. Set a flexible overall course for EIS implementation

For Vendors

1. Clarify the EIS definition issue.
2. Increase emphasis on the data pipeline capabilities.
3. Expand consulting services support.
4. Prepare to deliver EIS applications.





EIS—Past and Future







EIS—Past and Future

The concept of executive information systems (EIS) has existed for some time. It has carried several names and has taken a long time to take on a character that is understood, used, and of recognized value. Although it has reached a stage of acceptance and perhaps even maturity, the EIS concept continues to experience major change.

In this chapter INPUT provides a conceptual, philosophical, and applied framework for the analysis of the EIS market that follows in Chapters IV, V, and VI. As is recognized by many, and reinforced by INPUT's research findings, EIS is having several effects on the information systems arena. Many of the effects go beyond senior executives' accessing information through computers. Throughout this report, INPUT's analysis steps back from the implementation of EIS to assess the implications of the EIS technology and development process on the information systems environment, and the positions taken by the growing vendor community.

A

Prior to 1990

EIS in its current form has had a relatively short life. The term *executive information system* came into use in the mid-1980s. However, the EIS concept has existed since the mid-1970s.

Perhaps the initial identification of EIS was in the grand objective of the 1970s to create Management Information Systems (MIS). Few if any real MIS were developed for senior managers, but the idea took shape.

1. Foundation

The foundation of the current EIS can be traced to four technological developments of the late 1970s and early 1980s. These are listed in Exhibit III-1.



EXHIBIT III-1

EIS Technical Foundation

1. Fourth-generation language use by end users
2. Decision support systems
3. Personal computers
4. Relational data base management systems

- *Fourth-generation languages* (4GLs) evolved in earnest in the first half of the 1980s. By the middle of the decade 4GLs had become a tool used by many mid-level managers and analysts, and an occasional senior manager. The 4GL gave the user community its first real taste of direct interaction with the computer. The 4GL gave users the ability to create unique reports and to analyze their own data files.
- The 4GL era was paralleled by specialized 4GLs used to do financial modeling and specialized data analysis. The decision support system concept led to specialized tools and reporting systems that were created by specialists (analysts) but usually at the request of senior management.
- In the middle of the 1980s the personal computer began to crack the IS mystique by teaching the user to be highly independent and to build reporting and analysis systems much more quickly than with 4GLs on a host computer. Of course, users soon found that the data were all on the host and difficult to access. The personal computer made graphical display of data relatively easy.
- The relational data base management system contributed significantly as well. Because of the table concept used to establish data relationships, it became easy to create and modify data relationships, and the DBMS concept became understandable to the user. With a relational DBMS it became possible to construct special-purpose, easy-to-access data bases with which the user could directly interact.

The growing acceptance and use of these four technological developments by the end-user community set the stage for a creative software developer to package them into a specialized application, called the executive information system. The EIS software package was born in about 1984 as an application software product for senior management.



2. Breaking New Ground

The EIS pioneers applied the power of the PC and relational DBMS technology to a higher, more specific use. In truth, they broke much new ground in the end-user computing arena. Exhibit III-2 identifies six areas of information systems and end-user computing in which EIS has led computing to new plateaus.

EXHIBIT III-2

Breaking New Ground with EIS

1. New category of user
2. Relational data base management systems
3. Information versus data
4. Graphical user interface
5. Integration of personal productivity tools
6. Cooperative processing

- EIS introduced a category of end user to computing: users at the most senior levels in the company. Although in many instances senior executives were no more or less computer literate than other classes of end users, their interest, expected type of use, and general expectations set unique challenges when compared to the experiences of the information center before EIS.
- EIS was one of the first application areas in which the relational DBMS came into common use. RDBMS capabilities provided the data base technology necessary to stage the data and summarized information in support of the impromptu and on-demand query from the EIS user.
- Turning data into information has always been problematic for IS departments. The common solutions of report upon report and data-packed screens have not fully met middle management—let alone senior management—needs. The EIS pioneers had to learn how to present information (value-added data) so the user could quickly capture the essence of the message and proceed to the next query or decision. The advent of the personal computer and its easy-to-use graphic creation tools provided a key ingredient to the launch of the EIS era.



- The graphical user interface (GUI) pioneered by Apple on the Macintosh, and in growing use on all types of workstations, pushed ease of use to a new level. The EIS pioneers used this capability to put a face on EIS that the casual user could accept with comfort. The result is that GUI has begun to change the human interface for all classes of systems.
- The personal computer also provided the EIS pioneers with the ability to link in alternative applications of less importance but of value to the way executives work. Tools such as calendars, notes, and access to external news services are extras that help sell EIS.
- The initial EIS software products introduced cooperative processing, first in an interactive PC-to-host format, and now using LANs/servers. EIS applications are teaching IS personnel and the end user about cooperative processing (the distributed processing of the 1990s).

In INPUT's *Workstation Strategies* series of reports published in 1987 and 1988, INPUT recommended that the intelligent workstation (commonly a personal computer) should be viewed as the "window to the information network." In that report the progress made by the early EIS vendors was cited as a primary example. The success of EIS in the past few years reaffirms INPUT's position. EIS is truly a ground-breaking use of computing technology in the general business arena.

3. Stages of Evolution

As cited earlier, EIS technology has progressed through several stages in its short existence. This subsection provides a useful perspective on that evolution.

In Exhibit III-3, INPUT identifies the significant stages through which the EIS concept has and is projected to progress.

- The first stage, before the existence of EIS products, can be called the *embryonic* period. As with many new IS concepts, the goal is attempted and often accomplished, but there is no standard name to describe it. INPUT's user survey found a number of EIS systems designed in the late 1970s and early 1980s, usually with mainframe technology, that helped establish the framework for the first EIS products.
- INPUT refers to Stages 2 and 3 as the *application* period. Very specific products were brought to market to provide a specific application, an executive information system. The initial systems were fairly structured, and in the beginning suffered from a text-oriented interface, but they captured the attention and use of many customers.



- Stages 4, 5, and 6 represent the evolution from application-specific to tool kit periods. Many vendors have become and are becoming active: the solutions vary and the application-specific elements of the tool kits are less important than the development capabilities. IS is actively involved and each EIS is truly a customized application. The last phase of this period—Stage 6, Information Pipeline—will change the character of EIS to true cooperative processing. It will also decrease the dependence on the host data base component.
- In Stage 7, INPUT predicts EIS will return to the application-specific orientation, while the tool kits used to build an EIS will become as common as 4GLs. The executive information system will be one of the many applications that use the power of the workstation to present

EXHIBIT III-3

Stages of EIS Evolution

Stage	Timing	Description
1. Before EIS Products	Before 1985	DSS through conventional software tools
2. First EIS Products	1985	The arrival of Command Center and Commander/EIS.
3. Graphical User Interface	1987	Power of the PC captured Ease of use a reality
4. Alternative Platforms	1988	LANs, minis, and PCs
5. Many Vendors in Market	1989-1990	Many technical approaches become available
6. Information Pipeline	1991	Direct access to operational data bases
7. Everyone's IS	1992-1995	EIS user interface spreads to traditional applications

information and provide decision support capabilities to executives and management of all levels. The technology will be used to build elements of systems for everyone, and executive information systems for executives.



Few IS concepts have so quickly undergone such evolution and change in character as EIS has experienced. However, given the degree to which the early users and vendors of EIS have broken new ground, these changes are not surprising. Exhibit III-4 summarizes this evolution and change.

EXHIBIT III-4

Evolution of EIS Technology and Its Use

	1985	1990	1995
Development System	Application system product	Special-purpose development tool kit	General-purpose development tool kit
Frequency of Use	One application	Some applications	Many applications
Type of User	Select executives	Executives and managers	All levels of management

The focus for both user and vendor is broadening quickly about EIS concepts. Certainly if EIS helps the initial user—senior management—to perform better, then an EIS can have even greater value to the larger end-user community. Thus, it is logical that the vendor community and IS department are already beginning to apply the elements of EIS to a larger audience.

B

EIS—A Definition

The initial section of this chapter has provided a historical and evolutionary look at EIS. Now one must attempt to define EIS. Having already introduced the concept that EIS has had multiple definitions, INPUT found that EIS has a different meaning to the user and vendor communities. In its research for this report INPUT found that:

- It is relatively to say an EIS is a computer-supported system to provide information to executives.
- It has proven more difficult to define the standard components of an EIS.



There may in fact be no complete or standard definition for an EIS and one may not be essential. INPUT found that an EIS is a concept, a new approach to distributing information, and a journey for those involved (i.e., the user, the IS organization, and the vendor).

1. What Is an Executive Information System?

In this section INPUT looks more closely at the definition of an EIS; first to more clearly delineate the application versus development tool kit issue, and second to examine the components of a total EIS.

a. Application or Tool Kit?

The answer to the question, "What is an EIS—an application or a tool kit?" depends on whom you ask. The question introduces the user view versus the vendor view issue addressed in Chapters IV and V and directly impacts the conclusions and recommendations in Chapter VI.

To information systems departments and end users, an application is a system that addresses a specific information problem. Whether IS develops or buys a general-ledger system, it ends up with an application. The system may be customized and modified over time, but it is a specific application.

- Experience to date with EIS installations has shown that they are often made up of several applications, are prone to frequent change, and in many instances simply function as an information window to a more traditional application.
- Efforts to develop EIS have been prone to false starts. The system has experienced low use when finished and undergone frequent change, perhaps because the standard user definition of an application does not apply. The IS tendency to approach EIS as IS has traditional application systems has been a factor in these negative experiences.
- Each EIS has two types of users—users who query the information and those who provide the information. Certainly to the information provider who is supporting some portion of the total EIS, the EIS is considered an application system.
- The end user and the IS department are best served by thinking of an EIS as a specific application. This permits the developers to maintain a focus in an area where expansion and change are part of the environment. Without a sense of focus it will be difficult for those developing the system to meet user needs.



The vendor, on the other hand, is interested in defining a market opportunity. As we have long experienced in the information systems market, what the vendor creates does not always map directly to a real user need. Again considering how much new ground is being plowed by EIS, it is not surprising that the vendor community would have trouble defining EIS as well.

- Vendors started with the application viewpoint but moved to a tool kit definition, thus creating a framework to satisfy more buyers and broadening the market, which has been fairly narrow. The tool kit definition allows vendors to enter the market without going through the learning curve associated with building specific EIS applications, as did the EIS pioneers.
- The tool kit definition also allows the vendor to escape the task of defining EIS to the user. The vendor provides a group of tools that experience has suggested help make up an EIS environment and lets the user do the real definition job. Through experience, vendors have decided that an EIS should contain a number of elements from which the user or his/her IS support staff can choose.

The market is currently operating with both definitions. The entrance of a number of vendors with modest-to-complex tool kits is forcing the vendors that created EIS to shift their focus. The result is a looser definition and more confusion, resulting in a need for user caution.

The user may persist in thinking of an EIS as a specific application. However, the tendency of the vendors to provide tool kits will eventually cause either EIS to return to the specific application definition or users to adopt another name for management systems.

b. EIS Components

Exhibit III-5 provides a definition of EIS by identifying the components of EIS tool kits. These components exist whether there is a workstation/host, workstation/LAN, or just a workstation environment. The table also gives another view of the evolution of EIS.

- Current releases of EIS tool kits are addressing information pipeline and personal tool integration, and beginning to provide CASE-like development tools. These capabilities will permit the user to enhance and personalize his/her system with limited involvement of the IS support staff.



- Future releases are destined to merge decision support system capabilities with EIS. Expanding the "drill down" concept that is a trademark of EIS applications and adding the ability to build DSS-type analytical queries on the fly will speed the use of EIS-type systems at lower levels of the organization. Direct data access to operational systems and data import/export at the workstation will also be an essential part of this capability.
- Future releases will also strengthen the EIS environment by incorporating true text management search and retrieval capabilities as well as image processing. For example, the currently available Apple Macintosh systems use HyperCard and image capabilities to include scanned pictures in an EIS data file stored at the workstation.

EXHIBIT III-5

EIS Definition—Tool Kit Components

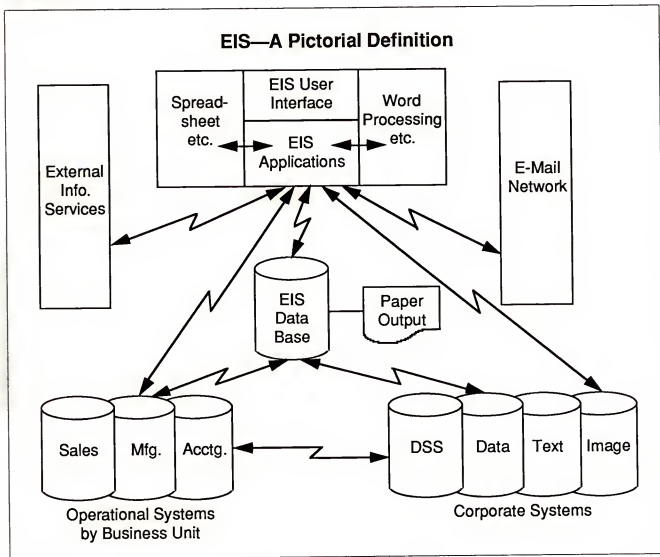
Component	Original	Current	Future
Relational Data Bases	X	X	X
Character User Interface	X		
Graphical User Interface	X	X	X
Personal Use Tools		X	X
CASE-like Development Tools		X	X
Direct Data Pipeline - Import & Export		X	X
Decision Support Tools			X
Text Management			X
Image Processing			X



c. A Pictorial Definition

Exhibit III-6 diagrams EIS within an information processing environment, and does so with an eye to the evolving future environment.

EXHIBIT III-6



- To the user, EIS is his/her workstation and the common EIS user interface (hopefully graphical in nature) to all types of information services, including the EIS. The EIS applications will have to fit in with the other uses of that workstation and the common GUI chosen (e.g., Windows, OS/2, etc.).



- To the provider of information for EIS, the system is a communication channel among various individuals and groups within the organization. The information provider simply wants to know that his/her full message is available to the user.
- The EIS data base is simply a staging device. Where that data base is located is not important except to the IS department; IS oversees the information network environment and the required reprocessing, reformatting, and security.
- Surrounding the workstation and the data base are interfaces to the rest of the information network, such as:
 - Direct access to the E-mail network
 - Direct access on a query basis to operational data bases for daily or on-line information already available there
 - Direct access to other corporate data files and applications, including text management and image processing applications that are becoming common
 - Direct access through the EIS user interface to external data and text services such as Dow Jones and others
 - Scheduled and on-demand access to paper versions of some of the EIS applications provided on the workstation. Since senior executives cannot yet carry computers everywhere they go, paper output in an EIS graphical style remains an essential ingredient.

Both of these definitions emphasize the tool kit orientation of EIS. They describe the elements or components that can be included in an EIS environment, thus reinforcing the task faced by the user and the IS department. EIS is not bought, but is constructed later. Elements that make EIS development unique will be described later in this chapter.

2. EIS Compared to Traditional Applications

INPUT's research identified numerous ways in which EIS applications are different from traditional application systems. Exhibit III-7 lists the key elements and how they compare.

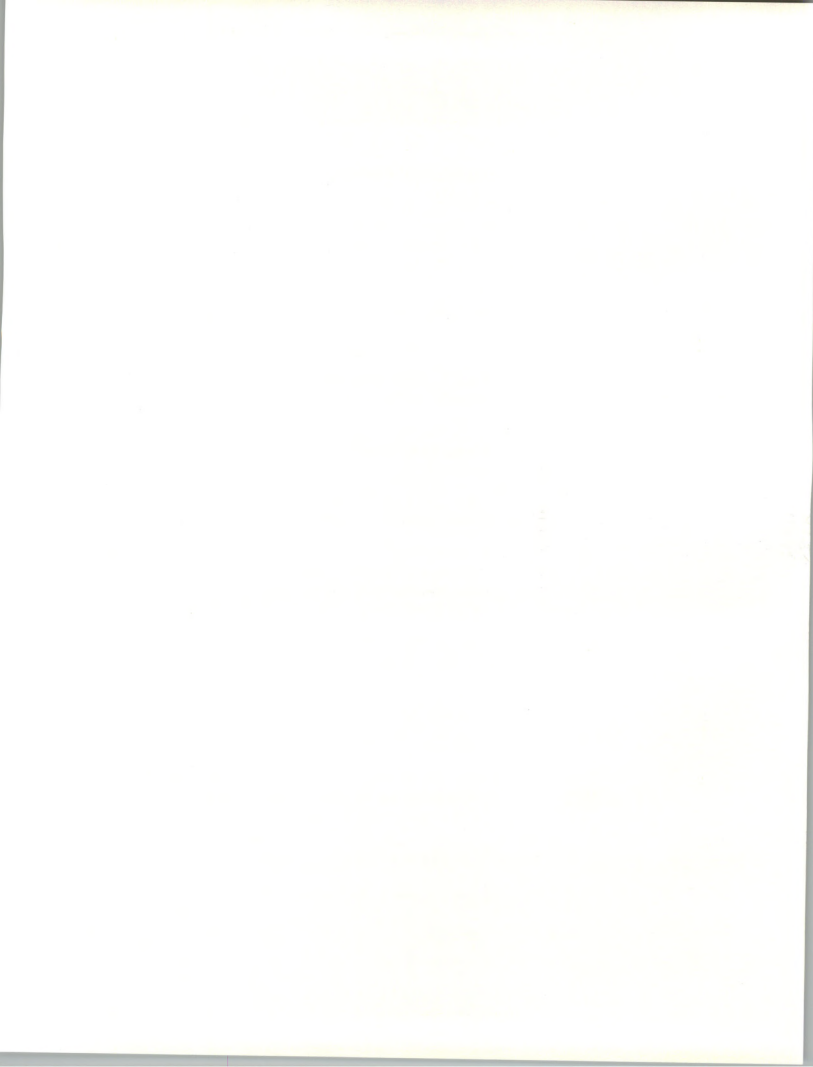


EXHIBIT III-7

EIS and Traditional Application Systems Key Differences

Item	EIS	Traditional Application
1. Business Objective	Nonspecific	Specific
2. Data Purpose	Analysis of data	Collection of data
3. Data Focus Information	Value-added	Data
4. Type of Use	Spontaneous and intermittent	Scheduled and continuous
5. Type of User	Individual and unstructured	Structured group
6. No. of Users	Multiple, growing, and changing areas	Fixed number and one area
7. No. of Functions	Multiple, variable	Fixed (single or multiple)
8. Exposure	High and wide	Contained
9. Development Process	Evolutionary and continuous	Structured and phases

- The business objective addressed by a general ledger or order entry system is quite focused, while that supported by an EIS is not specific and is continuously changing.
- An EIS application involves a user of data providing cognitive association of data to create information, whereas traditional systems involve collectors of data.
- An EIS is designed to provide access to information (value-added data), not to produce original data.
- The use of EIS is spontaneous and intermittent, not scheduled and continuous.



- The user of EIS is an individual whose use is unstructured. Traditional application systems are usually used by a group in a structured fashion.
- EIS involves changing user populations (growing in number and across many functional areas), while traditional systems have one fixed user area.
- The exposure of EIS is high and wide, not contained. EIS is subject to many opinions and criticisms.
- The development process of EIS is continuous, not structured with specific phases.

Each of these comparisons adds to the framework and understanding required when setting out on the EIS journey.

3. EIS Impacts on Applications Development

It is not INPUT's intent to describe how to develop EIS. However, as part of the effort to define executive information systems, it is appropriate to note how EIS development can affect the applications development process and function.

Exhibit III-8 identifies some of the few impacts of EIS and differences from the traditional development environment and process.

EXHIBIT III-8

EIS Impacts on Application Development

- The need for knowledge about the business has never been greater.
- The user is both more and less capable of describing what is needed.
- The prototype is a must, and may become the real system.
- Successful EIS is undergoing constant modification
- EIS is likely to require changes in supporting systems.
- The politics can be extreme.



- The requirement for systems analysts to understand the business has been vital for fifteen years. That requirement reaches new levels when EIS is involved. Working with executives, dealing with constantly changing requirements, and translating less precise requirements into informative displays and integrated information sources requires a level of maturity and creativity beyond that of most systems analysts, including those with information center experience.
- Ask one executive what he/she wants from EIS and a precise answer will be provided; ask a second and no answer will result. However, both will have needs and they may be very similar. Experience has shown that the show-and-tell approach may be the most successful. In Chapter IV, INPUT identifies "prototype" as one of the EIS commandments.
- To IS personnel, maintenance (modifications and enhancements) is a frequent, irritating duty. With EIS, however, it is a constant obligation. What may be an important information report today can quickly become passé. This constant change (some call EIS a journey) provides further support for the prototype-and-run philosophy employed by many in the EIS development and support process.
- Executives have seldom, if ever, been involved in the definition of the operational information systems of their businesses. Executives have operated above information systems. However, as executives become exposed to EIS capabilities, it is very likely that they will ask for information that the existing systems cannot provide. These requests can cause the redefinition of terms and data elements used in existing operational systems.
- Information gets to executives today through direct reports and support staffs. With EIS, executives receive information directly. Another EIS commandment discussed in Chapter IV is that EIS must involve the providers of the information and not interfere with traditional management processes. The goal is better and faster information to support the decision-making process, which requires significant cooperation.

There are several informative books and numerous constructive articles about developing EIS.

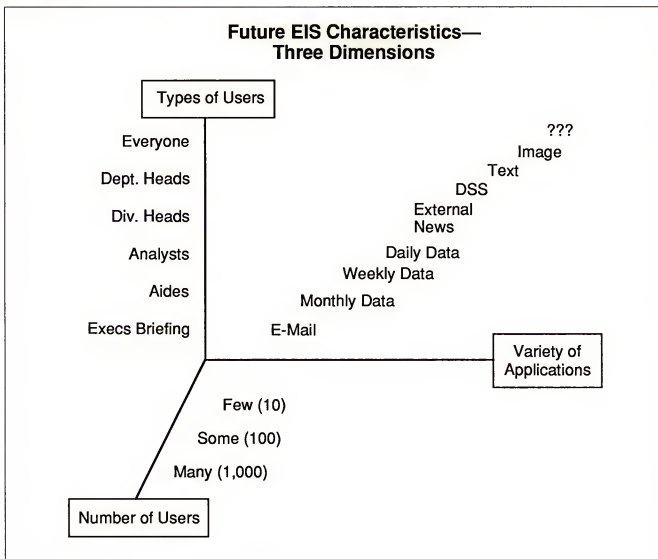


C

After 1990

Throughout this chapter, EIS has been portrayed as a concept, an application, and a software technology in evolution. The real EIS remains a system for the executive, but EIS has now taken on a broader character. In Exhibit III-9, INPUT has drawn together all of these trends.

EXHIBIT III-9



When considering EIS technology and applications, the following must be considered:

1. *Types of Users*: Even at the beginning, there will be more than one level of user. Over time, EIS will grow into many EIS installations serving many levels of management. This suggests a need for an underlying standards effort.



2. *Types of Applications:* By definition, EIS is now a variety of services, tools, and information sources. A framework is essential from the start on how EIS technology will fit into the existing and planned information network of the organization.
3. *Number of Users:* As EIS technology spreads, the number of users will grow from a select few to many. Since one of the key elements of EIS technology is ease of use and the ability to personalize one's EIS, a great deal of thought on control, security, training, and more must go into the process of developing EIS technology within an organization.

As with all previous expansions of end-user computing, there is no stopping EIS; one can only attempt to set the course and steer.





The User View







The User View

Chapter III provided a structural perspective on the EIS arena. In this chapter INPUT provides a quantitative and qualitative look at EIS from the user's point of view—in particular, that of information systems (IS) departments.

This chapter first presents the quantitative findings under the headings of activity level, characteristics, development, and performance. Then INPUT identifies the key elements of the EIS development journey and provides guidelines that, if carefully considered, will help set the course for a successful EIS journey. As noted in the introduction to this report, it is not INPUT's intent to provide an EIS development manual; others exist. What is presented are several insights into the uniqueness of the EIS development task based on the experiences of those who participated in the research.

A

Demographics

INPUT conducted an extensive mail survey, as well as some in-depth telephone interviews with IS and end-user project leaders currently involved in the EIS implementation challenge. The demographics presented in Exhibits I-1, I-2, and I-3 support INPUT's belief that the results of the analysis provide a true representation of EIS activities within larger corporate organizations.

- The mail survey included essentially all industry segments. Industries with the greatest representation were process manufacturing (18%), discrete manufacturing (17%), insurance (15%), distribution (8%), banking and finance (8%), and transportation (6%). (See Exhibit I-1.)
- The distribution by revenue indicates that 83% of the respondents have annual revenue above \$100 million, 43% were large organizations (with revenue greater than \$1 billion), and 23% were very large organizations (revenue greater than \$10 billion). (See Exhibit I-2.)



- The IS budget distribution was more evenly spread. Many of the larger organizations that responded have decentralized IS organizations; the corporate IS budget represents only corporate expenditures. EIS is obviously a corporate issue or has been until now. (See Exhibit I-3.)
- As expected, over 85% of completed mail questionnaires were from IS departments. The majority of those were IS executives at either the vice president or director level.

Please note that in this chapter the term EIS will refer to the user view that EIS is an application or a group of applications, not the tool kit used to create the applications.

B

Status and Activity

INPUT's quantitative look at EIS provides a solid picture of a specific adaptation of software technology that is well beyond the embryonic stage. The adaptation is in use or in development by a significant portion of the potential user base, though the adaptation still has a long way to go to reach maturity.

- All of the EIS users interviewed who already had EIS applications also indicated ongoing development and expansion.
- In the mail survey, those that had an EIS installed commonly indicated that they had further applications in the prototype stage; had plans to add subapplications, users, and functions; and occasionally were looking at the technology to see if products from additional vendors should be acquired.

As expected, there is no indication that the EIS phenomenon has taken its final shape.

This section of Chapter IV includes nineteen exhibits based on the specific responses to the mail survey. The supporting text draws conclusions from the findings and explains the exhibits where clarification is necessary, but does not describe each exhibit in detail.

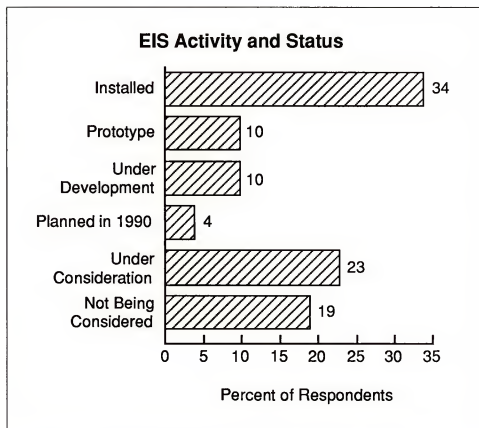
1. EIS Activity Level

INPUT found EIS activity strong and growing appreciably within the surveyed population. (See Exhibit IV-1).

- Over a third (34%) had at least one EIS installed and another 23% were actively developing EIS applications.
- Of those indicating an installed status, a significant proportion also indicated they had additional EIS projects in prototype status or under development status.



EXHIBIT IV-1



- Fewer than one in five respondents (19%) indicated that EIS was not being considered. The reason, almost without exception, was that there was no sponsor. Perhaps it is time for organizations not considering EIS to look to internal IS departments to provide the leadership to start the process.

Exhibits IV-2 through IV-5 indicate that the use of EIS is spreading and will continue to spread—from the initial application for a few select executives to multiple EIS for many users in numerous functional areas.

Exhibit IV-2 indicates that 43% of respondents currently have several operational EIS installations and 13% have five or more EIS installations. The existence of multiple EIS installations is already commonplace.

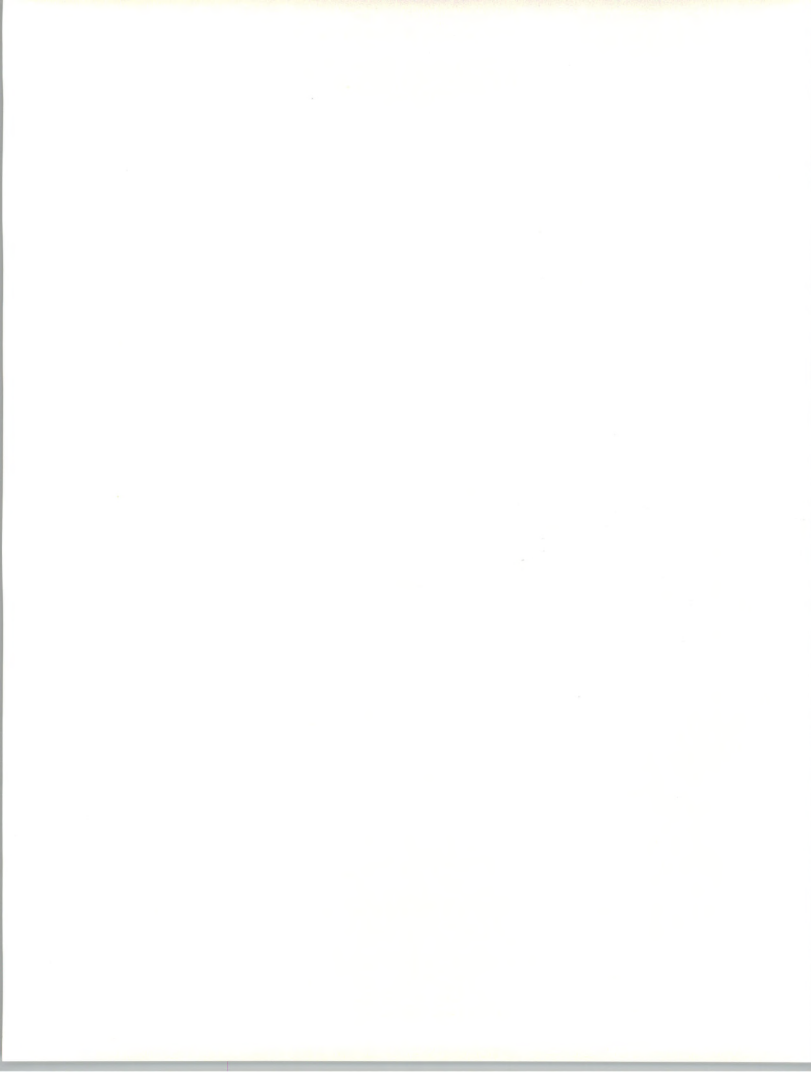
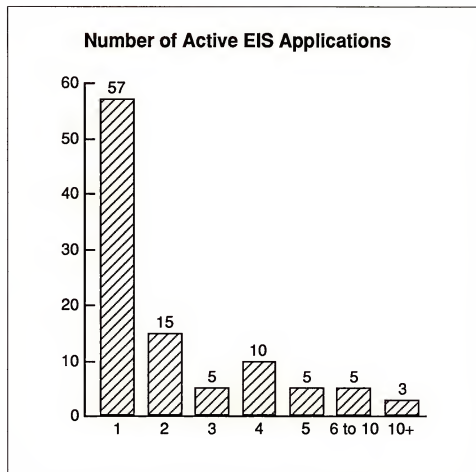


EXHIBIT IV-2



The analysis of the size of the user population presented in Exhibit IV-3 shows the current distribution of the user population (early 1990) and that planned for the end of 1990 and 1991. Exhibit IV-3 indicates a steady and significant growth in the population size.

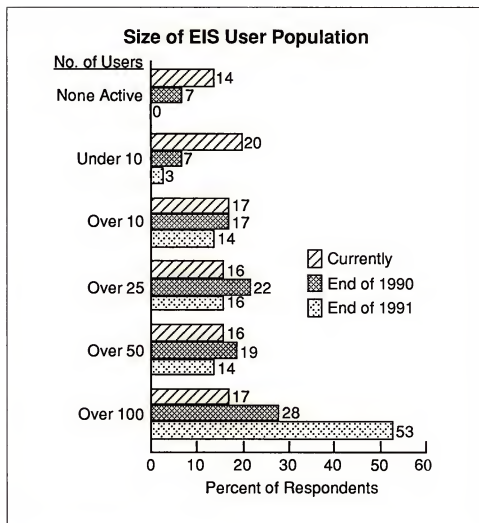
- Of respondents to the question about user population, just under one-half (49%) indicated they already have more than 25 users. This includes 17% who have more than 100 users.
 - By the end of 1990, 47% will already have over 50 users, including 28% with over 100 users.
 - By the end of 1991, the over-100-user category will jump to 53%.
- For most organizations, when the EIS user population goes above 25, a single EIS installation will no longer be adequate.
 - There will be multiple EIS installations running in several functional areas supporting operational as well as staff functions.



- Typically, when the user population reaches 50 to 100, EIS will have spread beyond the executive group to several management levels.

Although an EIS effort may start with a single or, at most a few, intended users, the findings indicate that the user population quickly grows to a size well beyond that of the senior executive staff. This size suggests that EIS development and support plans must consider a large, diverse, and constantly growing user population.

EXHIBIT IV-3

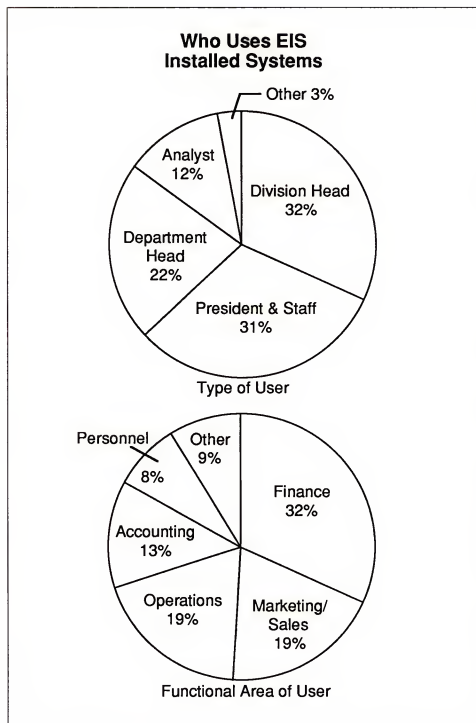


Exhibits IV-4 and IV-5 provide a picture of where EIS is used, who the users are, and where the users work within the organization.

- Exhibit IV-4 provides two analyses of the user population for installed EISs.



EXHIBIT IV-4



- The first analysis suggests that the type of user, though usually upper management, is not limited to the president and the staff. Equally common are division heads or department heads.



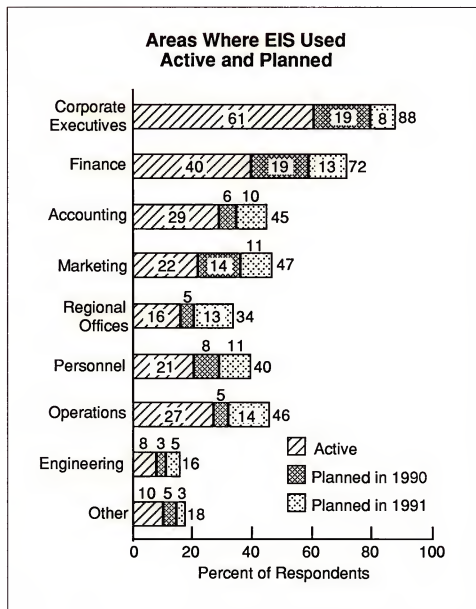
- The second chart indicates which functional areas have EIS users if they are not in the executive suite. Not surprisingly, 32% are in finance and 13% in accounting. These two areas represent the most common information providers, and thus must be part of the user community.
- Of greater interest is the finding that marketing/sales and operations each make up a sizeable 19% of the current users of installed EIS applications. This high percentage provides further verification that EIS has broken out of the presidential staff arena and is being used in more operationally oriented areas of the business.

Exhibit IV-5 shows where the active EIS applications reside within the organization. The exhibit provides a picture of where EIS is used, how widespread that use is, and where use will expand in 1990 and 1991. The respondents gave multiple responses for the active, planned-in-1990, and planned-in-1991 categories.

- Not surprisingly, the most active use of EIS is within the corporate executive group (61% of the responses). If goals are achieved, the penetration will reach 88% by the end of 1991 as systems currently under development and planned are implemented.
- The penetration in finance closely matches that in the executive group. High penetration supports the claim that a successful system will be used by information providers as well as information users.
- The penetration in personnel, marketing, accounting, and operations is similar for each function. This similarly supports INPUT's belief that EIS is already spreading into operating and middle management.
- Only the engineering area is currently being left out of EIS progress and plans. The low level suggests that EIS software does not provide adequate tools for project and cost control tracking, which are key performance indicators for this function. This inadequacy presents an opportunity for software vendors.



EXHIBIT IV-5



2. EIS Characteristics

The next four exhibits show the contents of existing EIS applications and plans for additions through 1991.

Exhibit IV-6 indicates the number of active subapplications and Exhibit IV-7 the distribution by type of subapplication. The list of subapplications used identifies the frequency of reporting and supporting data update (monthly, weekly, and daily). It also includes the common personal support applications offered by most of the vendors (i.e., E-mail, calendaring, notes, to-do lists, and external news service access).



- Exhibit IV-6 shows that the number of subapplications included in the installed and prototype EIS systems varies from a single subapplication (e.g., monthly or weekly reporting) to as many as eight subapplications.
 - The distribution is fairly even, with 70% including at least three subapplications.
 - The average number of subapplications per EIS installation is four.

EXHIBIT IV-6

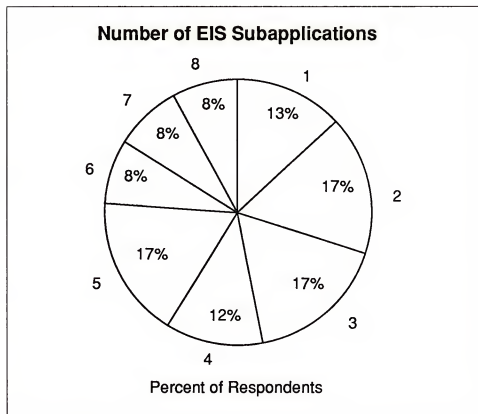


Exhibit IV-7 provides insights into two questions. First, how important are the ancillary applications—such as E-mail, calendaring, and news services—versus reporting internal information? Second, by defining four types of reporting applications (board material, monthly, weekly, and daily), an assessment of the information focus of EIS is obtained. The respondents indicated multiple subapplications for the active, planned-in-1990, and planned-in-1991 periods.

The most common subapplication was monthly reporting, which is currently active in 58% of EIS installations and will grow to 90% in 1991. Monthly reporting is at the heart of the typical EIS installation. INPUT defined four reporting subapplications because they are in fact different and because of a desire to determine whether EIS use is

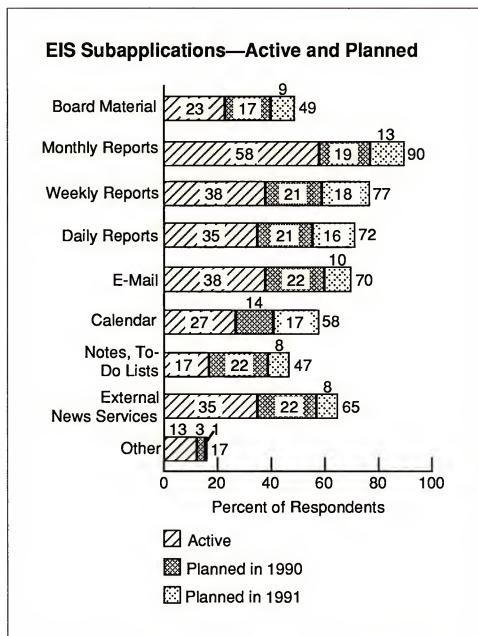


responding to management's need for more-timely information.

- Building an EIS feeder system on a monthly basis is far easier than daily. Reasons are that the process can be less time-critical, many operational systems already do the necessary summarizing, and the information provider is available to add commentary where required.
 - For a daily system there is far less time for further processing and analysis before sending the information to the EIS data base. Over time, the emphasis on daily information will increase the need to link the EIS user interface and its users to the operational data bases.
 - The use of EIS for presentation of material to boards of directors shows the lowest penetration of the reporting subapplications. Though there is time to polish and prepare the material for a board meeting, the EIS emphasis is moving toward operational control (weekly and daily information), not the reporting of history.
- The findings indicate a reasonably strong and growing presence of weekly and daily subapplications.
 - Over one-third of the responses indicated that weekly and daily reporting were already active. Both will grow to over 70% penetration by the end of 1991.
 - If EIS is to help run the business, not just report on it, the technology must support daily and weekly reporting. The challenge is in the information pipeline part of EIS technology, not the presentation of the information.
- The personal support subapplications had varying measures of penetration.
 - E-mail and news services were reasonably strong; they existed in over one-third of the active EISs and will expand to over 60% in 1991.
 - The calendar and to-do applications trailed to some degree but will reach over 50% in 1991.



EXHIBIT IV-7



One further look at a functional picture of EIS activity is appropriate. Exhibits IV-4 and IV-5 showed where the user worked and where the EIS resided. Exhibit IV-8 analyzes the categories of data included, or planned to be included, in EIS.

- The dominance of financial data (55%) is as expected, as is a reasonably high percentage (33%) for accounting.
- It is appropriate to note that in all of the functional analyses the percentage for finance exceeds that for accounting. This is attribut-

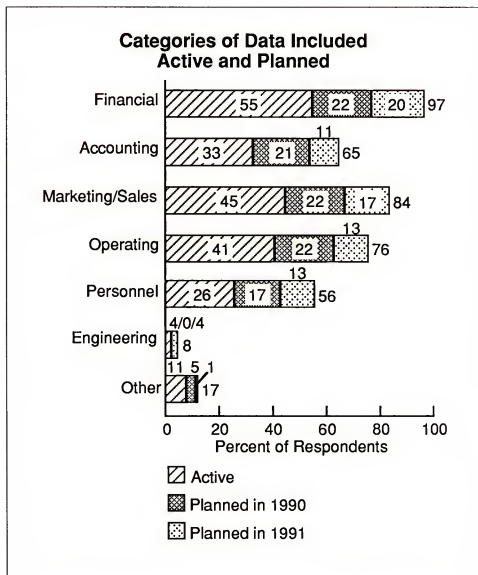


able to the EIS emphasis on information versus data. Accounting collects data, whereas finance turns the data into information.

- By the end of 1991, plans indicate that financial data will be in over 95% of EIS installations.
- The percentages for marketing (45%) and operating (41%) suggest the growing focus of EIS on running the business rather than monitoring history.
 - The high and growing use of marketing information (84%) is significant since in many companies the marketing systems are often the least integrated within the overall information network and may not be adequate provider systems.
 - The growth in the use of operational data is less than that of marketing by only a small amount.
 - The planned growth in both of these data categories underlies the increasing presence of weekly and daily reporting.
- The reasonably strong emphasis on personnel suggests that personnel data are being requested by senior and human resources management. EIS technology is helping management recognize employee-related trends.
- Exhibit IV-8 also supports the earlier comment that EIS is not serving the engineering area.
 - Project tracking capabilities for new products and related programs would be logical areas for EIS expansion by users and vendors.
 - However, it is fair to note that the required feeder systems for engineering and project tracking needed to support an EIS do not exist in many information networks.



EXHIBIT IV-8

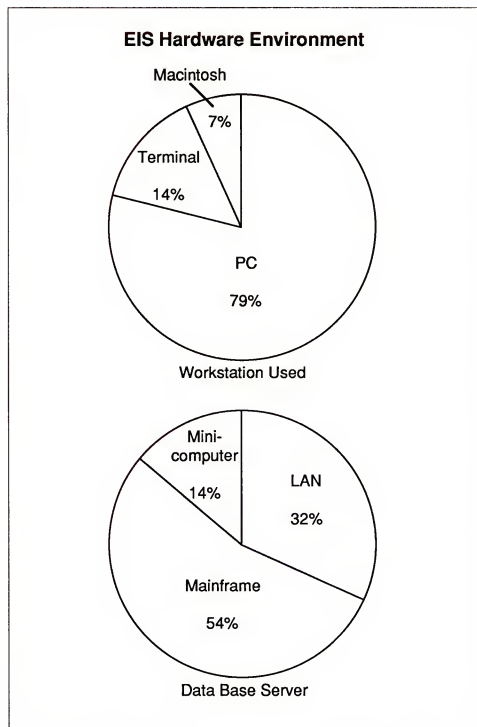


The two charts in Exhibit IV-9 characterize the hardware environments currently in use. The first chart shows the distribution of the types of workstations and the second indicates where data base servers reside.

- Not surprisingly, the IBM PC (and compatibles) is the dominant workstation for EIS. The Apple Macintosh is a recognized alternative and its share is certain to grow at a modest rate.
- EIS installations using a terminal as the workstation are typically older systems installed before the existence of the current EIS tool kits. However, note that Holistic Systems (the developer of Holos) offers a Digital Equipment-based EIS tool kit in both PC and terminal versions. The goal is to avoid the issue of hardware changes where there is an installed midrange environment.



EXHIBIT IV-9



- The distribution of server environments already shows the growing importance of LANs in the EIS arena and in computing generally.
- EIS growth is expected to take place primarily using LAN capabilities.



- Many of the existing mainframe-supported systems will shift to LAN/servers over the next few years.
- The 54% share using a mainframe as the data base server prompts two comments:
 - First, that the initial technology from Comshare and Pilot required this environment.
 - Second, the mainframe is where most of the primary data reside. The mainframe will continue to be the source of most data, whether the data are placed in an EIS data base or accessed directly by the EIS user. Mainframe computing will play a significant role in the EIS arena for as long as EIS exists.
- INPUT also inquired how often new hardware was required when implementing an EIS. Forty-three percent (43%) indicated that they had to add hardware capabilities.

The typical EIS application includes four subapplications and often daily or weekly as well as monthly information. It also includes information from several functional areas and uses a PC as the workstation. Over the next two years the number of subapplications will grow; there will be a shift towards daily, weekly, and external information; and the EIS data base will shift to a LAN/server.

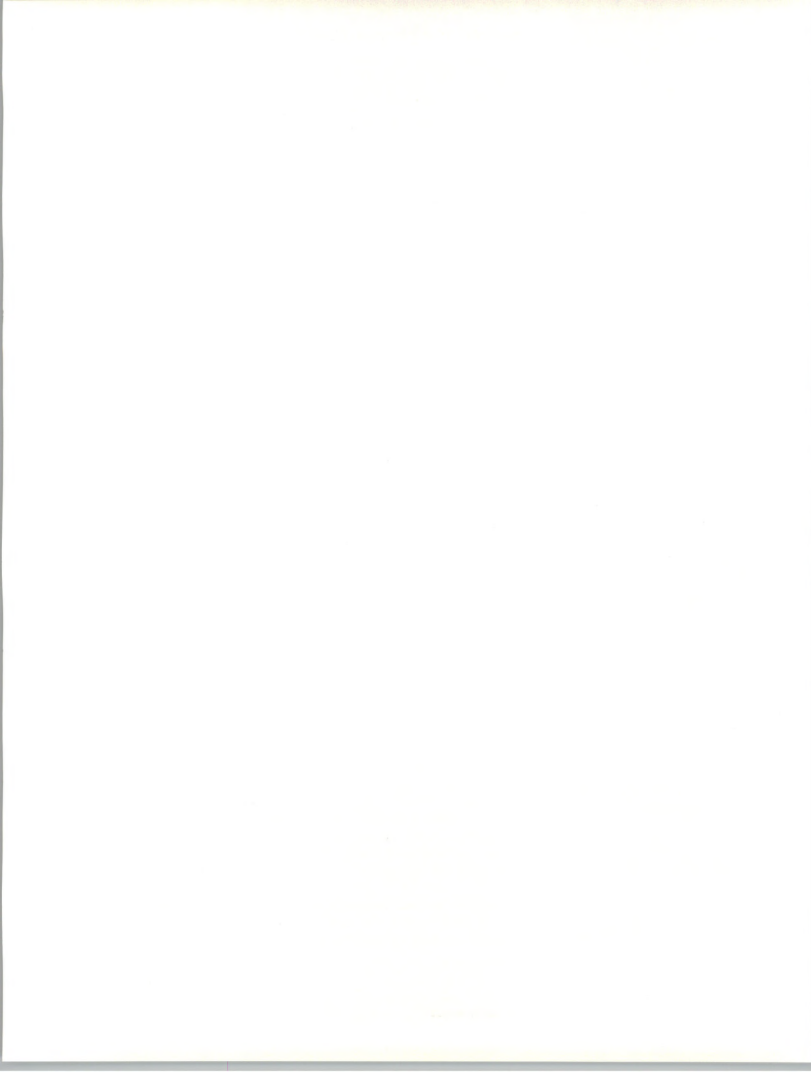
3. EIS Development

This section looks at the EIS development process: who is involved, why it is undertaken, how long it takes, and what it costs. Exhibit IV-17 looks at the frequency with which the EIS effort is abandoned and restarted.

a. Sponsorship and Support

The most common statement about undertaking the EIS journey is: "Don't start an EIS effort without executive sponsorship, preferably that of the president or a member of the president's staff." As Exhibit IV-10 shows, such sponsorship may no longer be necessary.

- Forty-six percent of the respondents reported that it was the president or a member of the senior staff who was the original sponsor for EIS activities within the particular organization. A further 15% indicated that a division head sponsored EIS within his/her business unit.
- However, in slightly fewer than one-third of the responding organizations, the original sponsor was the IS executive. Either those IS executives have decided that the technology warrants taking on a rather significant risk, or they just want credit for the success.



- Certainly EIS has generated enough success stories that IS executives should be leading or directly contributing to EIS implementation.
- IS departments select and buy the chosen EIS technology in almost every instance, as reported by the vendors. No successful EIS can be built without IS help to build the links to existing systems.
- Furthermore, if EIS technology is to spread across the IS network, as suggested in Chapters III and V, it is critical that the CIO find a senior executive who is willing to be a cosponsor and to begin the EIS journey.

EXHIBIT IV-10

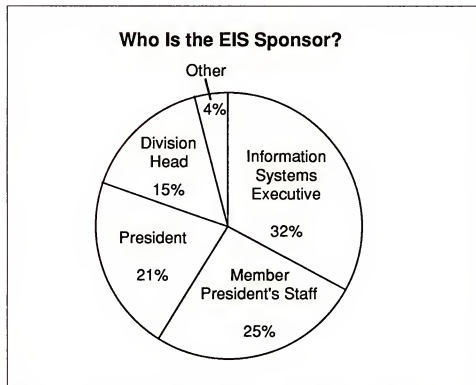


Exhibit IV-11 summarizes the goals of the original EIS sponsor. The respondents were asked to list three goals. In general the goals were fundamentals of basic management and not the current management buzzwords, such as *gain a competitive edge*. Goals such as timeliness, support of the management process, quality, flexibility, and quick access to information do not reflect anything but the use of available information to achieve everyday improvements to the running of a business.

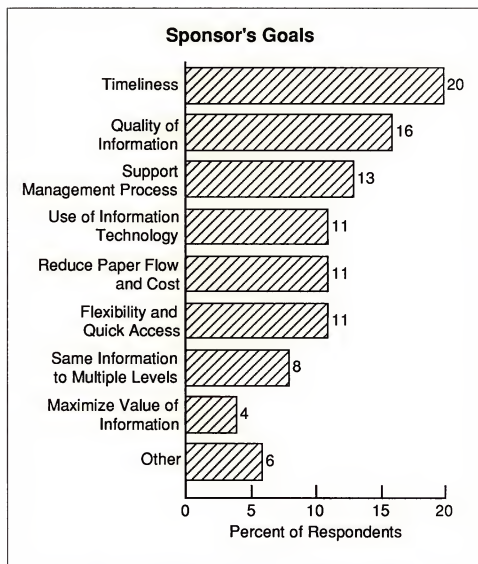
- Perhaps the listed goal that is the most surprising is *use of information technology*. It was mentioned 11% of the time and is directly related to the frequency with which the IS executive was the sponsor. It is vital



to recognize that EIS technology is a new type of information technology and to push to gain value from its use.

- All of the other goals listed essentially involve recognizing that information is an asset of the organization whose value should be leveraged. Whether the goal is timeliness, reduction of paper flow and cost, or providing similar information to multiple levels, the benefit to the organization can be the same—better management decisions.

EXHIBIT IV-11



- Timeliness, mentioned by 20% of the respondents, was and should be expected to be the most common goal. The rating of timeliness simply reinforces the belief that today's businesses must operate faster to keep or improve market position.



- The goal of providing similar information to multiple levels was mentioned 8% of the time, often enough to suggest that management, as well as the EIS vendor community, will drive the use of EIS software technology to lower levels of management.
- The three goals making up the 6% in the Other category were: to access external information, to obtain specific information (e.g., project status), and to gain a competitive edge.

As with most end-user computing programs, the project leadership for EIS development can come from a number of sources. Exhibit IV-12 indicates that the user was the leader in 36% of the responses and there was joint leadership in another 9%.

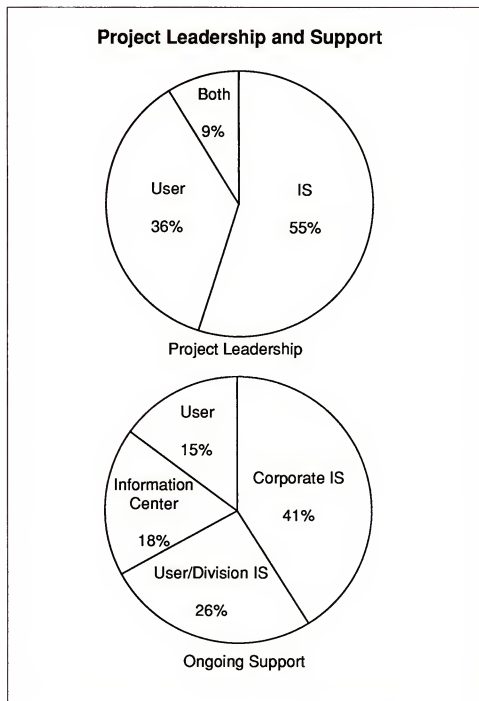
- Certainly, the development of EIS is a cooperative effort. There are many types of users (executive, information provider, executive assistant, and more); new technology is used; a direct link to the core information network of the organization is created; and, in many instances, changes to operational systems are required. Successful EIS requires effort from the IS department and the user.
- Developing and implementing EIS has many of the characteristics of a systems integration project. Fortunately EIS development and installation is not as difficult and can be achieved in small steps, but the dynamics are the same—in a word, complex.
- The disappointing response in these findings is that the leadership was not more often both user and IS.

After EIS is installed, the support issue arises. An EIS support staff will need to be dedicated for as long as the EIS exists.

- Each enhancement will probably impact the data pipeline to operational systems as well as require some interaction with the user.
- As expected, the support task falls primarily to corporate IS (41%) and its ally, the information center (18%).
- However, 41% of the time the support responsibility falls outside corporate IS, 26% with a decentralized (user department or division) IS group, and 15% with the end user.
- This data supports INPUT's contention that EIS is already out of the executive suite and is a force in the continuing movement of computing responsibility to the user.
- As with other end-user computing programs, if the user is to provide the support staff, the EIS tool kit selected may need to be different.



EXHIBIT IV-12

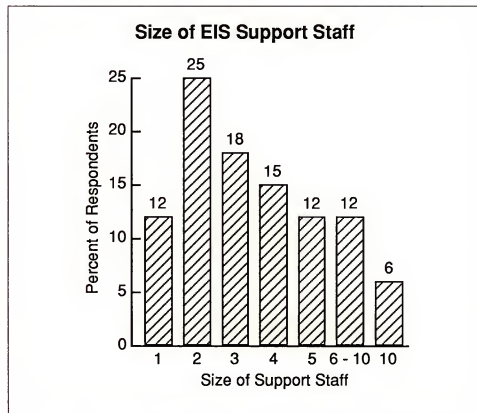


The size of support staff required by an EIS is also an important issue. If the user is in the senior management group, quality and cost of support will be key issues. Managers expect very high quality but often have no historic frame of reference about the cost of supporting complex information systems. Exhibits IV-13 and IV-14 indicate that the support cost is significant.



- The findings indicate that a support staff of three or more EIS professionals was in place almost two-thirds of the time; all of the time, once there were more than 25 users.
- There seems to be no relationship between status of the EIS effort and the size of the support staff, except after the staff reaches a size of 6 or more. This reinforces the belief that there is little difference in support effort required, whether an EIS is installed or under development.
- Support staffs of 6 or more were not uncommon (18%) and usually marked a very large development effort. These larger staffs may also present a more accurate indication of the effort required to interface with the operational systems that provide data to the EIS.

EXHIBIT IV-13

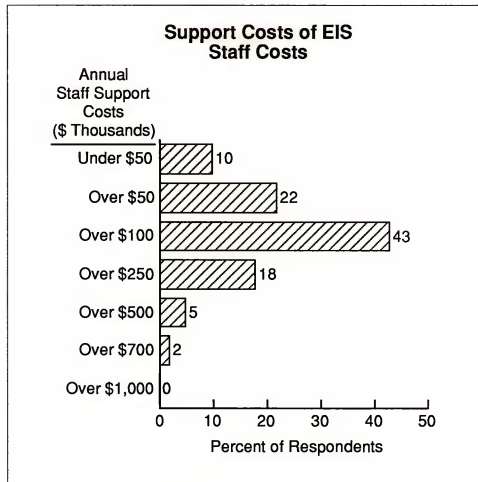


- Exhibit IV-14 shows the distribution of the annual cost of the support staff. The cost ranges from below \$50,000 in 10% of the responses to a high of \$850,000.
- The average annual cost was \$178,000, which coincides with a support staff of about three full-time professionals.



- The vast majority (75%) indicated annual staff costs of under \$250,000.
- Of course, the typical 15% per year software maintenance costs must be added to the staff costs.

EXHIBIT IV-14



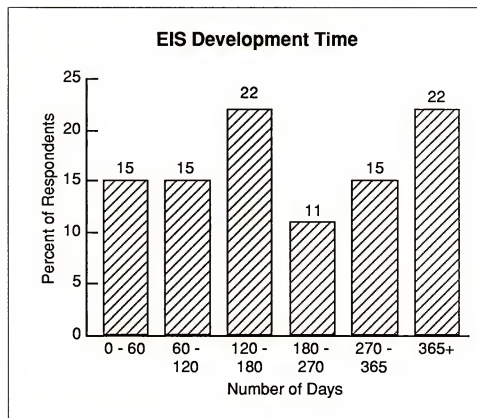
b. Development Effort

Much has been written about how the development of EIS should proceed in short steps (prototype, refine, install, and repeat the cycle). Many authors suggest that an initial system is possible in under 90 days, yet the findings indicate that the initial investment can reach over \$1 million and take a year to complete. The next two exhibits provide a look at how long it can take and how the initial costs can vary from very low to very high.



Exhibit IV-15 shows the development times for the 60 EIS projects (either completed or in process) that were reported in the survey. If there is any conclusion, it is that the initial development of an EIS can take as long as one wants or allows it to take.

EXHIBIT IV-15



- Project lengths of under 60 days occurred in 15% of the sample, confirming that an initial system can be built and installed quickly. Another 15% of projects were completed in fewer than 120 days.
- At the other extreme, 22% of the projects took or were planned to take over one year to complete. Half of the planned or in-process (versus completed) projects were scheduled to take over 270 days. Undoubtedly (hopefully) these projects included interim implementation steps. Who wants to keep senior management waiting for a year?
 - INPUT believes there is a need to find and follow the critical path, and then plan to add extraneous elements of the EIS in future phases. Present what is possible and tell management what it takes to obtain what else they want. If you have executive support, respond quickly—not nine months later.

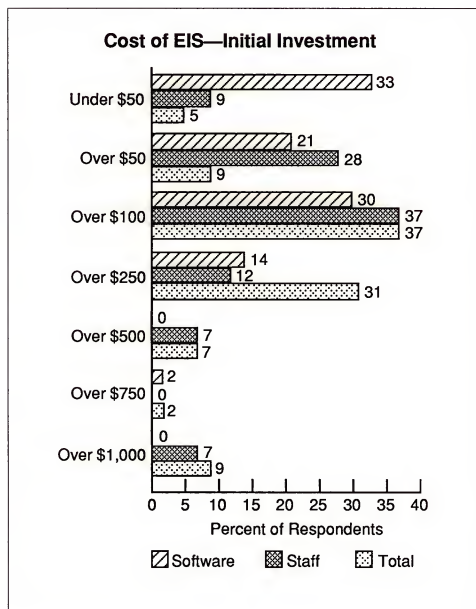


Tied to the development effort is the initial investment required for EIS. Exhibit IV-16 provides the data from 43 responses concerning EIS costs. Please note that the costs indicated *do not* include the cost of hardware.

- Affordable software investments were indicated in one-third of the responses. Keeping the software cost under \$50,000 provides room for error. As Chapter V will show, an EIS tool kit can be acquired in this price range.
 - More-typical software costs range up to \$250,000, reflecting the current prices from the major vendors.
 - The average software costs were \$138,000.
- Staff and other (nonhardware) costs tended to start higher (over \$50,000, or close to a year's worth of effort) and ranged to over \$1 million.
 - Two-thirds of the projects had staff costs under \$250,000.
 - The average for these projects was \$251,000, reflecting the 10% of the projects with staff costs exceeding \$750,000.
- The third set of bars in Exhibit IV-16 shows the total costs for the projects.
 - Just over half cost \$250,000 or less, certainly an affordable level for most larger organizations. Another 31% costs less than \$500,000 (but more than \$250,000).
 - At the extreme were the 9% of initial investments that totaled over \$1 million. When the price gets to this level, it may be time for cost justification, which is seldom done for EIS. These costs probably include operating systems improvements required to feed the EIS.
- INPUT's findings indicate a somewhat higher cost for an EIS installation than that reported by other research. This discrepancy may be explained in part by the focus on large organizations, as indicated by the demographics in Chapter I.



EXHIBIT IV-16



c. Abandoned EIS Efforts

Another side of the EIS story is that many EIS efforts fail. Some analyses have indicated as many as 75% fail in the first try. Certainly, there are reasons for a first EIS effort to have difficulty and starting over can be expected. That is why the prototype approach is so strongly recommended. However, a failure rate of three of four, or even two of four, is hard to accept.



Exhibit IV-17 provides a look at failures. INPUT received a response to questions concerning success and failure of prior EIS efforts from half of the respondents. (See Appendix A, Questions 6f, 6g, and 6h.)

- A full 37% of those responding indicated they had had at least one prior failure. Although not the 75% indicated by others, 37% certainly is a significant failure rate and a confirmation that caution and care are required for EIS success.
- The majority of those responding now have operational EIS or projects underway.
- The second chart in Exhibit IV-17 shows the reasons for abandoning an EIS. The most common reasons were *no sponsor* or *an inadequate system*.
- The third chart shows that almost half (47%) of the EIS installations begun were abandoned after they were in production and another 42% in the prototype stage.

These data certainly support the strong recommendation to build a prototype and let the user try it before setting a final course for the EIS journey.

4. EIS Performance

A final quantitative look is provided by this section on EIS performance. INPUT asked each respondent to evaluate the performance of their respective EIS efforts in the eyes of five individuals: the original sponsor, the president or staff, a division head, an IS executive, and a member of the IS support staff. Although it is recognized that it is difficult for one individual to assess an effort from so many points of view, the responses do provide some insights.

Exhibit IV-18 shows the responses for the three user categories.

- Not surprisingly, the highest performance ratings were given by original sponsors. Certainly if there is success, the sponsor wants to toot the horn for EIS.
- The lowest ratings were given by division heads. Two reasons are suggested. First, many of the systems are being used by corporate executives to track and measure operating performance more often and in more detail. Second, the EIS may not meet the needs of the division head, presuming he or she is even a user at this point.
- On average, the EIS performance ratings were medium (3) or above, suggesting acceptable performance levels and a foundation for continued evolution.

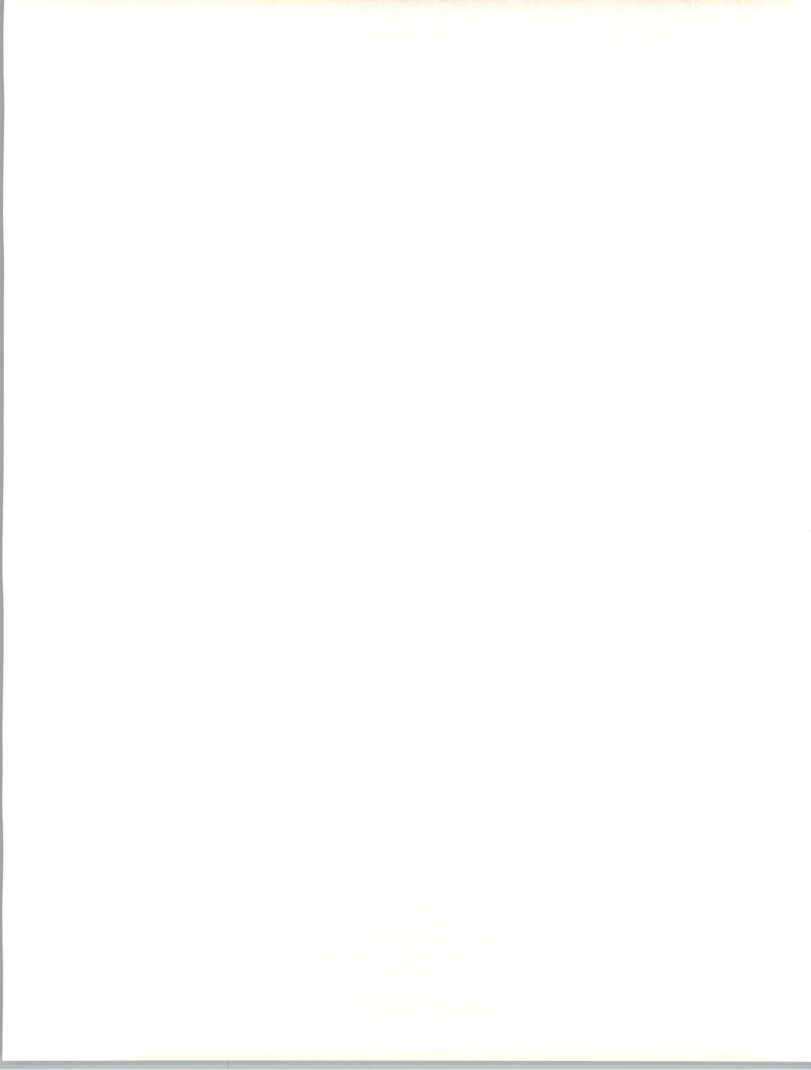


EXHIBIT IV-17

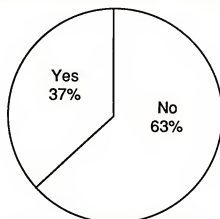
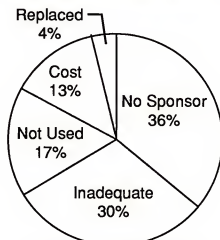
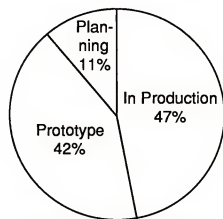
Analysis of Abandoned EIS Projects**Previously Abandoned EIS****Reason for Abandoning****Status When Abandoned**



EXHIBIT IV-18

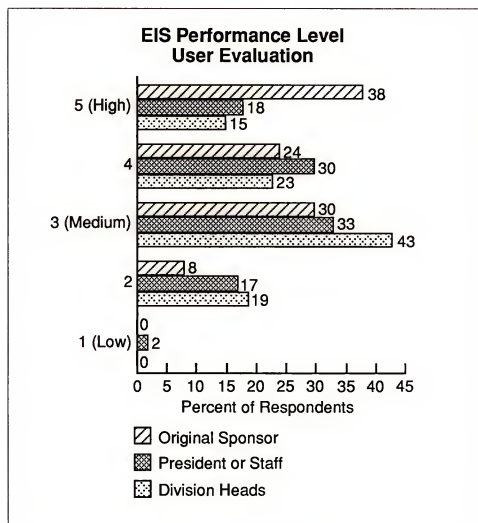
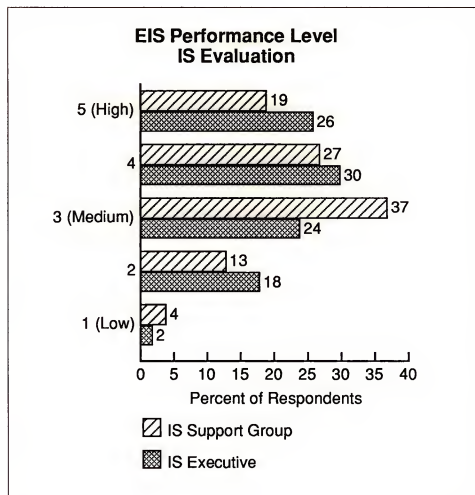


Exhibit IV-19 shows the ratings from the IS community. The IS ratings are in general somewhat lower than ratings from the user community.

- The IS executive ratings tend to match those of the president, and the IS support group ratings are similar to those of the division head.
- Certainly the IS support staff wants a strong rating, but they also want the opportunity to continue to develop and adapt the EIS technology.



EXHIBIT IV-19



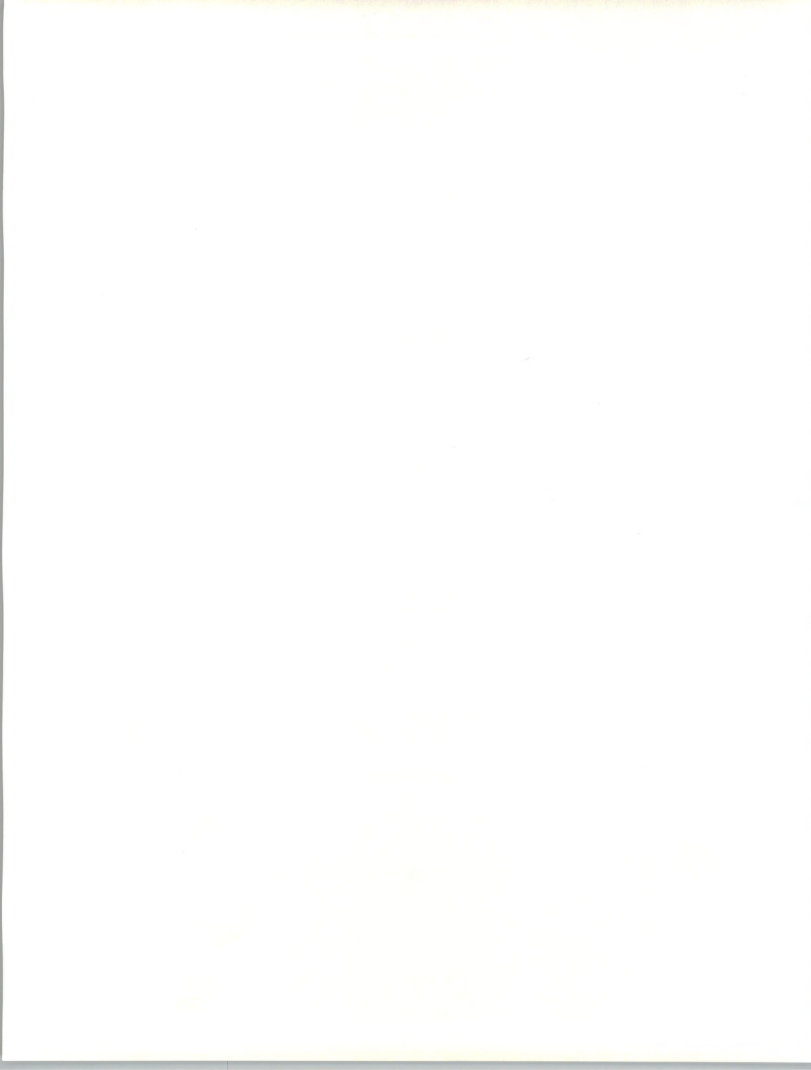
Overall, the performance ratings were fairly strong. There is no indication that EIS efforts should be diminished.

C

Lessons Learned

In this section INPUT has summarized what has been learned about building and using EIS technology. The objective is to provide a frame of reference for IS and user personnel who are chartered to lead an EIS project—in particular, the initial effort. Providing the frame of reference is done by:

- Differentiating the EIS development process from that of standard application systems
- Presenting a set of “commandments” for the EIS journey. These are time-tested rules of the EIS arena that, if followed, will help assure success.



- Providing insights to the use of current and projected EIS technology

1. EIS Development Cycle

After discussing the EIS development process with numerous vendors and users, as well as reviewing the results from the mail survey, it is still not clear that any given approach is better than another.

- Many of those interviewed characterized the EIS development cycle as build a prototype, implement, and refine. Yet INPUT found that many EIS projects are taking a year or more to complete.
- Many also suggest the EIS development process is never done, and others that the effort requires the use of an outside expert who has previous experience building EIS.
- Vendors emphasize the ease with which the graphical user interface can be developed and downplay the real job, which is building the data pipeline to the EIS data base.
- Independent consultants should ask executives what they want from EIS, yet the executives seldom know.

After research, discussion with sixteen EIS vendors, and interviews with numerous EIS project leaders, INPUT suggests that the best way to characterize the EIS development process is to define it in terms of the time it takes to perform each phase.

- The research conducted for the study indicates that the EIS journey can take as long as you let it. Certainly an executive who is unfamiliar with specifying information systems is not able to decide when the system is complete. Also, executives' requirements change continuously.
- Vendors are interested in selling consulting services as well as software, and thus are motivated to some degree to increase the scale of projects.
- IS departments typically have a development methodology with time guidelines for each stage. These guidelines can serve as a starting point.

Exhibit IV-20 defines the development cycle in standard phases followed by IS and compares the recommended time for development of a traditional application and EIS. INPUT believes that the time must be shortened significantly for each phase.

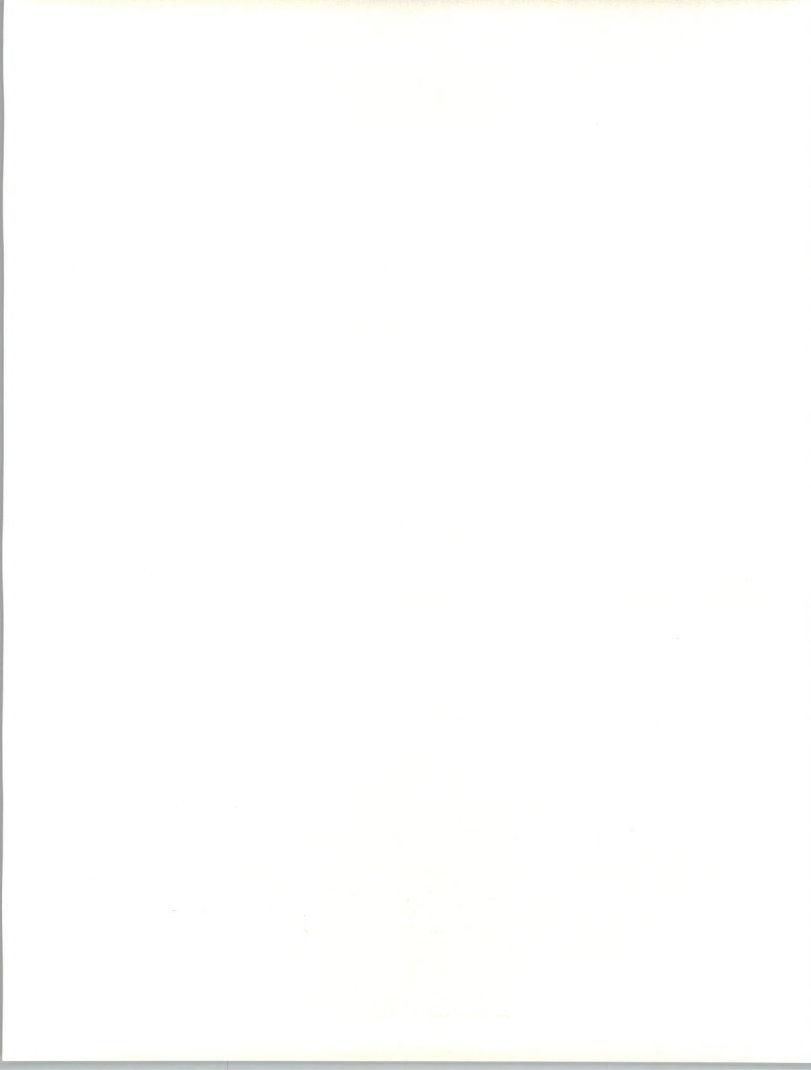


EXHIBIT IV-20

**EIS Development Cycle
Time to Perform**

Development Phase	EIS	Traditional Application
Initial Definition	Hours	Days
Requirements Specification	Days	Weeks
Prototype	Days	Weeks
Development (Refinement)	Weeks	Months
Implementation	Days	Months
Training	Hours	Days
Enhancements	Days	Months

- The initial installation, which takes days or weeks for a traditional system, should be accomplished in hours. EIS is a moving target, often highly personalized and not easily described. To gain a sense of the objective, a model should be built from which a clearer definition will evolve.
- That refined definition will permit a product specification that takes days to document rather than weeks. It should generate several EIS subapplications that can be developed either one at a time or in parallel, depending on resources and priority.
- Everyone asserts that prototyping is part of the EIS development methodology. However, many do not recognize that a good prototype can be the initial production version of the application. Using the piece-by-piece approach, the prototype takes days to build and can be refined in weeks (if not days) into a working subapplication, if each piece is kept small enough.
- By keeping each module small, the implementation and training process becomes modest. The executive user is not going to go to an all-day training class, and will get much more out of his/her EIS if the executive learns to use it a piece at a time.
- Enhancements, which are a part of any system, have proven to be of major importance in the EIS area. EIS is not static, and also vendor capabilities continue to expand. If the development of the initial EIS subapplications is treated as a series of modest projects, then an en-



hancement is just another project accomplished in the same way—by prototyping, refining, and installing, then repeating the process.

This development philosophy is not intended to understate the complexity of the tasks of building the user interface or the data pipeline and data base. It simply recognizes the user behavior that dominates the EIS environment.

- The typical user interface contains several personalized applications that are better built individually. More-creative presentations will result.
- The data pipeline and data base are an expensive part of the job; however, using relational data base technology permits the step-by-step approach.

IS should develop EIS the way a user builds PC applications—step by step by step.

2. The EIS Commandments

Any religion has its commandments. There are not always ten of them and for EIS there are probably more than ten. Exhibit IV-21 lists the EIS commandments from INPUT.



EXHIBIT IV-21

The EIS Commandments

1. The most important users are those that provide the information—support data ownership.
2. Involve the users administrative aide—create an inside ally.
3. Flexibility is the law—for user, developer, information provider.
4. EIS must be the fastest way to get the information, but must also provide a paper version.
5. EIS provides value-added information and must include text and comments.
6. EIS will expose weaknesses in the existing information network—be prepared to fix them.
7. Put the full underlying technology on the desktop the first time—only one chance to train the executive.
8. Do not charge-back EIS—this is not a cost justified application.
9. EIS implementation is a journey without an end, but you must set a course.
10. EIS technology will change the face of end user computing—information systems should get on with it.

- The users that will make EIS successful are not those for whom EIS is primarily designed, but those who currently provide the information to the executives. These information providers must be part of EIS. In addition, someone close to each executive user (i.e., an administrative aide) must be available to help, collect input for improvements, and serve as the conduit between the executive and the EIS support group.
- The importance of the information provider is paramount. If information providers do not cooperate, there will be competing information sources and EIS will certainly lose effectiveness.



- As the user population grows, the EIS support staff cannot be everywhere and therefore needs an ally close at hand when the executive screams for help. Including the administrative aide as a user of EIS will pay back in reduced day-to-day trouble-shooting.
- The structure of EIS is much closer to end-user computing than to the structure of an inventory control application. All those involved—user, information provider, developer, and others—must be flexible. Today's EIS will not be ideal for tomorrow. Change is an underlying tenet of EIS use.
- Commandments 4, 5, and 6 have a common theme. Successful EIS must be complete information utilities for the user community. If EIS is not the fastest delivery mode, does not give comprehensive information (including annotated text), or uses inconsistent definitions of key terms and information, the system will begin to fail.
 - EIS has to be the information source of choice and preferably the only one. If the executive user can get information by telephone or paper before EIS can provide it, EIS will not be used.
 - EIS provides value-added information, not just data. This means comments and graphical interpretation of data, as well as the ability to ask questions. Users will likely want to take part of the EIS installation with them, so a paper version must be available.
 - It should not be surprising if some common data element's definition gets questioned by executives using EIS. Executives were not consulted when the operational systems were created. If a definition impacts how decisions are made, the operating system that collects that data element will have to be changed.
- EIS is bringing the challenges of computing to a new group of users who are typically computer illiterate. Such users have to learn to use the computer as well as the EIS. It is best to put as much of the intended technology in place in the beginning as possible, so basic computer training is accomplished and does not have to be repeated. At the same time, the individual applications can and should come piece by piece so the user learns each fully.
- Chargeback is one of the nemeses of IS departments. No matter what is done for operational systems, the cost of EIS should not be charged back to executives. The system wasn't cost-justified to begin with, and if users spend time reviewing the operating costs, they are not spending time gaining value from the system.
- Commandments 9 and 10 set the challenge for IS departments.



- EIS is a journey without end, unlike the typical application development effort. However, it must have a course. Some standards are required, the data pipeline must be managed, and the technology will grow and should be monitored. These are IS department responsibilities.
- As the personal computer changed end-user computing, so will the adoption of EIS technology. New types of users; movement to a distributed, cooperative computing style; and adoption of graphical user interfaces all result from the use of EIS software technology. As EIS spreads to middle management, the concept will become as common as the 132-column printout. IS departments should be involved in, and in fact should be leading, EIS development.

D

Planning for the Next Wave

Chapter III described a software technology undergoing significant evolution and Chapter V will describe a vendor community that has expanded dramatically in the past year, with the market size growing at 50% a year. Whether an organization is just starting its EIS journey or is already well on its way, there are some key issues to focus on.

Exhibit IV-22 highlights a few key development considerations.

EXHIBIT IV-22

EIS Development Considerations

- Software selection is becoming much more difficult.
 - The probable user population will be much broader.
 - The learning curve must not be underestimated.
 - EIS technology is a blend of end-user and traditional computing.
 - The development process must be iterative.
-
- The alternatives now provided by the EIS vendor community vary greatly. The selection process will take more time, yet it is probably now acceptable to consider more than one product, especially as prices drop.



- A copy of RediMaster from American Information Systems for about \$1,500 can be used to start the learning curve and test the waters.
- If Focus is already in use, Focus/EIS can be acquired to leverage existing information data bases through departmental EIS.
- If senior management is truly behind an EIS effort, they should look to the software leaders, in particular when there is no existing 4GL to use for staging EIS data.
- Even if a company is just starting EIS, the spread of EIS within industry has developed interest at several user levels. Whatever plan is put in place, it is best to consider all the potential users at least to some degree. This may again suggest the use of more than one EIS tool kit.
- Perhaps more than other recent introductions of new development technology, the learning curve with EIS is quite significant. IS departments don't have experience with creating good information presentation systems and are still learning how to use relational data bases.
 - Experience has shown that graphical screen design, the selection of functions available on each screen, and the need to personalize EIS for each user create a challenge that the best systems analyst, information center consultant, or power user has likely not yet faced. This challenge is a key reason to seek some external experience.
 - IS has long talked about and even practiced prototyping, but prototyping is not the strong suit of the application development function. Prototyping is, however, a key element of success in EIS development, where progress is best made in small steps.
- End-user computing is ten years old, yet IS departments and users still struggle to meet on common ground. Because of the number of ways EIS is breaking new ground, there is a need for caution and renewed effort to find a common ground. The use of an EIS, when recognized as a form of cooperative processing, is a true test of leveraging information technology in the 1990s.
- All of the above suggests repeating one more time that EIS development must be iterative. There is much to learn, the user is unsure of his/her needs, and the needs will change at a fairly rapid pace. Development should be done in pieces—using the prototype, installing, refining, and going on to the next small need. Developers should be prepared to backtrack and refine again. In some instances a subapplication will be dropped when it is no longer important.



E**The Value of EIS**

INPUT completes its user view by identifying, in Exhibit IV-23, some of the values that organizations and IS departments gain through the adoption of EIS technology.

EXHIBIT IV-23

The Value of EIS

For the Organization	For Information Systems
Gaining added value from the information asset.	Providing greater value from existing systems.
Linking the last user community to the network.	Reaching upward in the user community instead of downward.
Linking end-user and traditional computing.	Serving the organization as a whole, not one of the parts.
Vitalizing the flat organization structure.	Supporting organizational change.
Supporting today's fast-paced business environment.	Putting a new face on the information network.

1. For the Organization

For the organization as a whole, the value of EIS includes leveraging an underutilized asset (information), adding one more user to the community, integrating end-user and traditional computing, and meeting the needs of today's faster paced, management-lean organizations.

INPUT considers these gains quite significant and well worth the investment in time, money, and effort.



2. For Information Systems

For information systems departments, EIS brings value as EI systems increase the value provided by existing systems and reach upward within the user community to gain added recognition. In addition, IS departments get an opportunity to serve the whole organization in a single effort and to better support the structure of the organization by putting a new and better face on the information network.

A successful EIS effort may prove to be one of the most valuable contributions an IS department can make to its organization in the early 1990s.







The Vendor View







The Vendor View

The EIS market is a software and professional services market currently served by a diverse set of vendors. As this chapter will show, the EIS market is modest in size, but is an important market for software and professional services vendors and does offer unique opportunities.

In this chapter the market structure and the ingredients that make it unique, attractive to a variety of vendors, and a pacesetter for other software markets will be described. Then the key vendors will be profiled, market trends characterized, and a forecast presented.

A

Market Structure

As a software tool and professional service market, the EIS market is modest, perhaps \$50 million in the U.S. in 1989. Yet the market offers opportunity and is strategically important to many categories of software vendors. Some of the vendors are dependent on it and some must be active to protect other software market sectors. When the sponsor of an EIS project is the company president, EIS offers the professional services vendors an ideal opportunity. These vendors love to sell top down.

- Although the EIS market was created by two pioneering companies, Pilot Executive Software and Comshare, it is now populated by about a dozen active software companies and directly supported by many of the major professional services firms. The EIS market is another market in which professional services revenue can exceed that from software, which easily leads to follow-on projects for the professional services firm.
- There are numerous types of software vendors. There is no longer a typical EIS software company. Many of the software vendors are:
 - Selling EIS as an add-on capability (Information Resources)

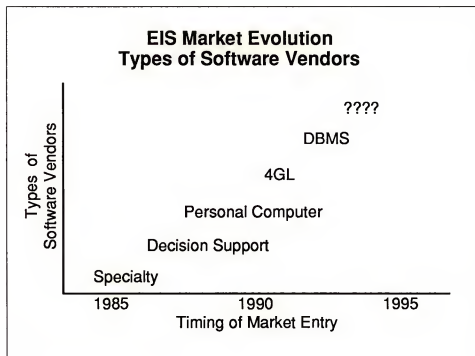


- Using EIS as a means to leverage income from and protect an installed base (Execucum and soon Information Builders)
- Using EIS to promote an underlying technology (EASEL from Interactive Images)
- Others are using the EIS market to bring new types of information access technology to the user (Holistic and Media Works).
- As the following confirms, the EIS market is unlike the more traditional DBMS, 4GL, or accounting applications software markets.

1. Market Evolution

In Exhibits V-1 and V-2, INPUT shows how the EIS software market has quickly evolved in types and number of software vendors.

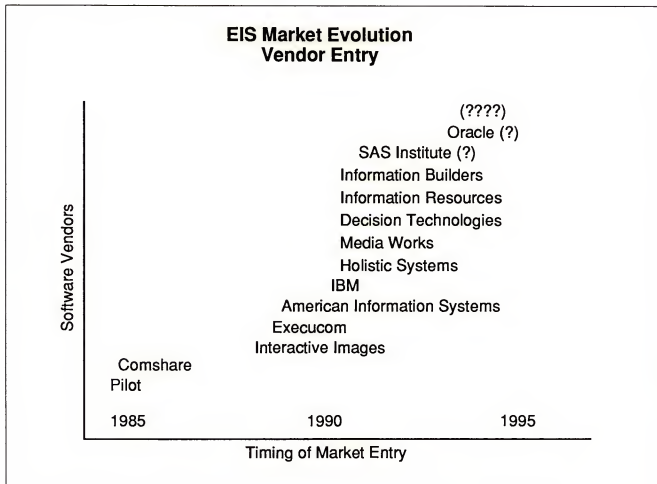
EXHIBIT V-1



- Starting with specialty vendors (such as Pilot and Comshare) who created the market, the EIS vendor community now includes DSS, personal computer, 4GL, and DBMS vendors.
- Exhibit V-2 shows that the vendor community consists of the largest and perhaps some of the smallest software vendors serving the Fortune 500 market.



EXHIBIT V-2



- IBM has chosen EIS as a means to promote OS/2, Office Vision, and cooperative processing.
- Mainframe end-user tool vendors such as Execucom (IFPS), Information Resources (Express), and Information Builders (Focus) find EIS an opportunity and a necessity.
- Start-up personal computer companies, such as American Information Systems and Media Works, are using EIS as a new entry point into today's large-company PC software market, both IBM- and Macintosh-based.

If the EIS opportunity is so attractive to this diverse group, can Oracle, SAS, Computer Associates, or others be far behind?



- The current SAS strategy, discussed in the next section on key vendors, is likely to change and become more formalized.
- Oracle might offer use of its forms product to build EIS applications on top of existing Oracle financial and operational data bases.
- The application vendors have responded to the EIS market with alliances (MSA and Ross Systems with Comshare). Perhaps their strategy confirms the vendor attitude that EIS is a tool kit, not a true application. On the other hand, perhaps vendors have missed an opportunity to strengthen their hold on their respective installed bases.

2. Approach to the Market

Not surprisingly, the approach to the market varies with the type of software vendor, both in product and support services strategy.

- In Exhibit V-3, INPUT has differentiated the fundamental approach by vendor type. Though perhaps oversimplified, this comparison provides an initial reference point from which a user can consider several of these vendors' solutions.



EXHIBIT V-3

EIS Market Structure Product Strategy Comparison

Category	Example	Approach
Specialty	Pilot Comshare	Template Interface Proprietary DBMS
Decision Support	Execucom Info. Resources Holistic	DSS Extension PC Add-on Tool Kit
Personal Computer	Interactive Images	PC Interface to IBM Environment
	Amer. Info. Sys.	PC Tool Kit Customized Data Access
	Media Works Decision Tech	Macintosh Tool Kit Customized Data Access
4GL	Info. Builders SAS Institute	User DBMS in Place PC Add-on Tool Kit
DBMS	IBM Info. Builders	PC Interface to Existing DBMS Applications

- Exhibit V-4 divides the existing vendors between solution- and product-oriented vendors.
 - The solution vendors are looking for the large, full-product sale, are prepared to provide significant technical consulting services, and are looking for top-down support for the EIS concept.
 - The product vendors are less selective—they are looking for an entry point at almost any level of management while promoting their particular technical specialty.



EXHIBIT V-4

**EIS Market Structure
Services Strategy Comparison**

Solution Vendors	Product Vendors
Comshare Execucom IBM Information Resources Pilot	American Information Systems Decision Technologies Holistic Systems Information Builders Interactive Images Media Works SAS Institute

- Holistic Systems is working from its DEC and DSS orientation to provide EIS-type applications at many management levels.
- Information Builders is working to build on the presence of Focus.
- Interactive's goal is to introduce its full EASEL-to-mainframe application interface development capabilities.
- AIS, Media Works, and Decision Technologies are promoting the independent power of personal-computer EIS solutions at an affordable cost.

3. Pricing and Buying Patterns

One of the frequent criticisms and drawbacks of EIS is the apparent high cost. INPUT found that EIS total development costs often reach \$300 to \$500 thousand and may even exceed \$1 million. When the number of initial users is considered, it is not surprising that there is criticism or even a scream or two. With as few as ten users and potential new hardware costs, the cost per user of an EIS can quickly reach \$50,000, a cost level unacceptable in a typical application system.

Exhibits V-5 and V-6 delineate the cost of an EIS installation.

Exhibit V-5 compares pricing and typical cost levels based on the software vendor interviews. With the entry of several new vendors, the variation in software costs has increased and pressure has begun to drive prices down.



EXHIBIT V-5

EIS Pricing by Software Vendors

Vendor	Cost of Software and Services (000)				
	Under \$10	Over \$10	Over \$50	Over \$100	Over \$250
Amer. Info. Sys.	X	X			
Comshare			X	X	X
Decision Tech		X			
Execucom			X	X	X
Holistic Systems		X	X	X	
Information Builders		X			
Information Resources		X	X	X	
Interactive Images		X	X	X	
IBM		X	X	X	
Media Works			X		
Pilot Executive Soft		X	X	X	
SAS Institute			X		

- With software prices ranging from under \$10,000 (American Information Systems) to over \$250,000 (numerous vendors), there is an alternative to fit most, if not all, situations.
- The relatively recent existence of five alternatives under \$50,000 suggests there will be downward pressure on the higher priced vendors. Vendors are already responding by offering a LAN-based system at a lower cost than a PC/host version.



- There are some hidden elements in the pricing structures to understand and consider.
 - Most vendors have separate pricing for the user runtime version versus the developer's tool kit. As the technology spreads across hundreds, instead of tens of users, separate pricing will become an issue.
 - The PC-only vendors don't provide the data pipeline software, assuming a 4GL or similar tool is in place. If not, there is an additional investment to be made.
 - There is a growing tendency for the primary vendors (e.g., Comshare, Execucum, and Pilot) to include consulting services, which drives up the initial cost, but which may be a necessary expenditure until internal IS staffs better understand the nuances of EIS development.
 - At the low end, the 4GL and DSS vendors' (e.g., Information Builders) pricing for EIS tool kits does not include a data pipeline. Prices include only the workstation development tool kit and some number of runtime systems.

Over 40 of the respondents provided information on the cost of their EIS efforts, both initial development and ongoing support costs. Exhibit V-6 provides a comparison of software costs to the pricing levels shown in Exhibit V-5. A more complete analysis of the costs of EIS is presented in Chapter IV.

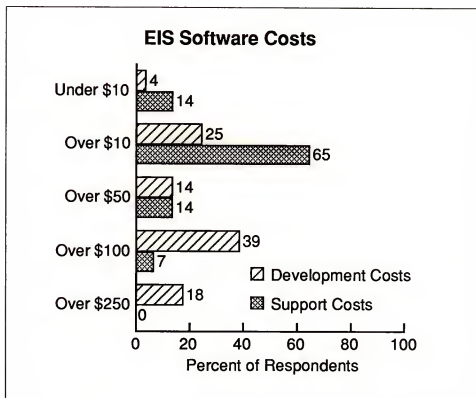
- Over half of the respondents (57%) paid over \$100,000 for the initial software and 7% are paying that price for software maintenance.
- At the same time, 29% invested under \$50,000 in EIS tool kits.
- Software maintenance costs tend to be at an affordable level (under \$50,000) in the vast majority of the responses.

The high-cost story that is repeated in the press for EIS software is certainly verified by INPUT's findings. However, there is also reasonable assurance that an EIS effort can be launched with lower-cost software.

- INPUT predicts that the lower-cost alternatives will grow in importance over the next few years.
- Vendor prices will decline as the LAN alternatives become the environment of choice and the vendor community continues to grow.



EXHIBIT V-6



INPUT expects the following to happen relative to pricing:

- Initial software costs will decline. Information Builders' Focus/EIS will be about \$40,000 and will include many days of consulting services.
- Emphasis on prototyping will cause more buyers to try a product like RediMaster from American Information Systems. No major evaluation is required for a \$2,000 test.
- A preference for LAN-based technology will also cause a general decrease in the software costs of EIS applications.
- Since the IS department is becoming the real customer, there will be a closer assessment of, and possible preference for, the products that build on existing capabilities. Such products are Focus and EASEL, which can interface directly with existing operational data bases.

In spite of the downward pressure on software prices, the expected spread in the use of EIS technology to lower-level management will cause the market to experience strong growth. (See Section D below.)



4. Role of Professional Services

Because of the size of expenditure often connected with EIS efforts, it is not surprising that the involvement of professional services, both from the software companies and independent professional services vendors, is common and a major cost factor.

In the research for this report, INPUT interviewed four major professional services firms currently active in the EIS arena (listed in Appendix C). Each vendor was questioned about its offerings. In addition, a series of questions about the use of professional services (numbers 18a through 18d in Appendix A) was included in the user questionnaire.

a. Vendor Involvement

Believing that the use of external services is key to EIS success, INPUT questioned the user respondents about the use of professional services, what tasks were performed, and what type of professional services firm was used. The results are:

- As shown in Exhibit V-7, INPUT found that over one-third (37%) of those actively involved with EIS had used or are using external consulting services.
 - The value of professional services is recognized by a sizeable percentage of those undertaking the EIS journey, and that proportion is increasing.
 - Of greater interest is that 50% of those currently in the prototype-and-under-development stages are using professional services. Fifty percent compares to only 30% use among those who already have an installed system.
 - Now that the market is reaching a reasonable size, the primary software vendors are developing expanded support services and the major professional services firms are training their staffs. The result should be an expanded availability and use of professional services over the next few years.

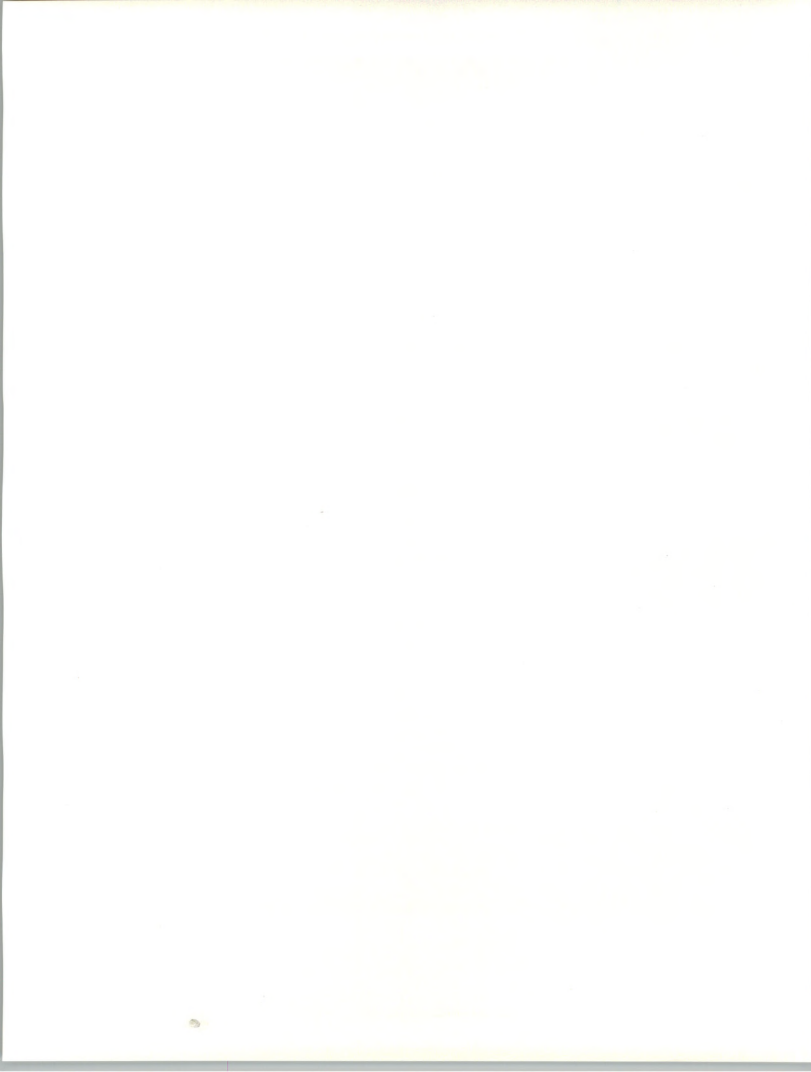
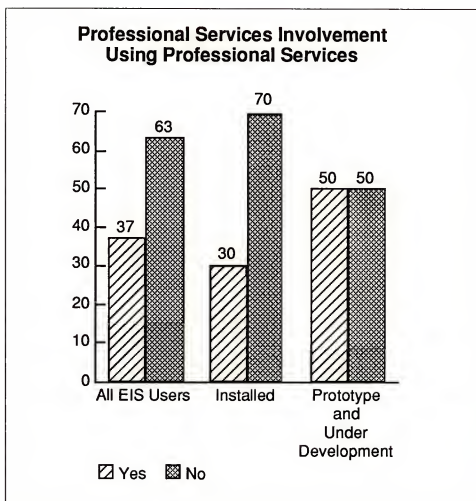


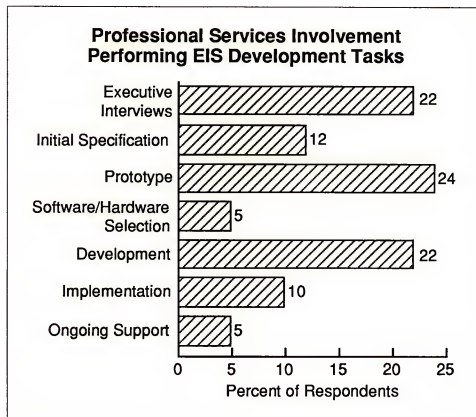
EXHIBIT V-7



- Professional services firms were involved in all stages of the EIS process and frequently performed three or four of the tasks in the normal development cycle. Exhibit V-8 indicates that executive interviews, prototyping, and development were the most common tasks undertaken by professional services firms.
- In two-thirds of the instances, the professional services firm was the software vendor, which would further support the prototyping and development involvement.
- As would be expected, both Comshare and Pilot were identified as providing professional services, with Comshare providing add-on consulting services to 27% of its users and Pilot to 20% of its users.
- There were some instances where two sources of external services were used—usually an independent consultant being the second provider.



EXHIBIT V-8



If there is any surprise in these findings, it is that the percentages are not higher. EIS use is breaking new ground, has high exposure, requires a learning curve, and is an area where the help of those who have done it before can be invaluable. If IS departments have learned anything during the end-user computer era of the 1980s, it is that end-user computing differs greatly from traditional computing. There is much to learn and external professionals are able to help.

b. Vendor Philosophies

At this point there are four philosophies operating within the EIS vendor community.

i. Major Professional Services Firms

- The four firms interviewed—Andersen Consulting, Booz Allen, Price Waterhouse, and EXIS (a Peat Marwick subsidiary)—see the EIS market as an important growth market. These firms have internal training programs designed to create true EIS development specialists, and development centers where they work with the alternative software. Although there are alliances with software vendors, the allowances allow flexibility and use of software of the clients' choice.



- All professional services firms see EIS as providing access to new IS buyers (executives) and a link to historic DSS activities. In addition, because EIS often uncovers a need for improved operational systems, EIS provides a source of traditional IS projects.
- An exception is Peat Marwick, which has a two-pronged strategy. It has formed a subsidiary, EXIS (cosponsored by Apple Computer) that is specializing in Macintosh technology to develop EIS applications. EXIS also provides traditional professional services as do its competitors.

ii. Primary EIS Software Vendors

- Comshare, Execucum, Pilot, and IBM all preach a solution sale, but come up a little short in their professional services offerings. These companies support the technical issues with expected strength, but are inclined to urge the client to gain business analysis assistance elsewhere. Because of the short history of EIS, this inclination is not surprising.
- All of these companies offer services throughout the development cycle and are receiving growing proportions of their revenue from consulting services.
- Professional services income has become significant to the growth of the two largest EIS vendors, Comshare and Pilot. It is estimated to have been about 25% of their EIS revenue in 1989.

iii. Decision Support Vendors

- Vendors with a DSS heritage (Holistic Systems and Information Resources) have a philosophy essentially the same as that of the primary vendors, with the exception that they more strongly favor the decision support aspects of the EIS arena. Perhaps they remain more focused on serving analysts rather than executives.

iv. EIS Tool Kit Vendors

- The personal computer vendors (American Information Systems, Decision Technologies, Interactive Images, and Media Works) and the 4GL vendors (Focus) offer the traditional technical consulting services based on the philosophy that their products can be used to build an EIS for anyone and everyone.



c. Importance to Market

By referring to Chapter III and the section on breaking new ground, it is easy to conclude that the role of professional services—from the software vendors, large consulting firms, and independent consultants—is essential to the success and spread of EIS.

- Since each new buyer of an EIS tool kit is starting a journey not undertaken before, there is much to learn. The journey is equal to any of those undertaken to date in the end-user computing era.
- The opportunity for failure has proven to be higher than that traditionally experienced by IS departments—thus, added insurance may be warranted.
- The cost per user is already high, and these systems are not being built on a cost-justification basis; therefore, insurance is affordable.
- The expectations of the resulting system are often high but not clearly delineated, and are driven by an external and internal understanding of the business. Outsiders should be considered part of the equation for EIS success.

B

Key Software Vendors

Each of the vendors interviewed currently plays, or soon will play, a definitive role in the EIS market. Each vendor impacts market direction and is a factor in the diversity of the approaches now available to the buyer of EIS software and services. Brief profiles of each of the vendors are included to help the reader grasp the diversity of technology and tools available, and as reinforcement of the analysis provided throughout the report.

As noted in Chapters III and IV, the user often views EIS as an application or type of application. The software vendor community, on the other hand, is more and more viewing EIS as one of the types of systems that can be built with a new type of development tool kit. This difference in point of view is what permits many different vendors to participate in the EIS market, and is causing the EIS market to change shape as we enter the 1990s.

1. Profiles

For each software vendor INPUT interviewed, a brief description of the vendor's product and approach to the EIS market, and a commentary on the vendor's role in the future EIS market, are provided.



a. American Information Systems

- **Product** - RediMaster is the true PC alternative. It carries PC pricing: \$1,495 for the development system and \$300 (much less in quantity) per run time system. It uses existing available software to communicate with data sources and to provide other common EIS applications (e.g., E-mail or external news services). RediMaster provides a presentation capability, not the tools to collect the data from operational systems.
- **Market Approach** - RediMaster offers a low-cost alternative that gives EIS capabilities to the smaller company and an easy-to-try starter system for any company. It promotes a fast start, keep-it-simple philosophy with extreme ease of use, and an open architecture in interfaces to sources of data.
- **Comment** - RediMaster lets IS staff or a skilled user experiment with EIS before the executive sponsor starts asking for EIS. It is a solid product for prototyping and learning by users, information providers, and system developers. It has the power to produce a lasting system, although one that is not as integrated as the more-powerful EIS tool kits. The existence and reasonable success of RediMaster will put pricing pressures on all other companies telling the user community there can be a low-cost approach.

b. Comshare

- **Product** - Commander/EIS was the second EIS product to reach the market. It now has the largest user base (about 375 sites) and controls about half of the market. The early versions were considered applications, but Version 2.0, released in 1989, is truly a development tool kit. Commander emphasizes the PC portion of the technology, pushing as much of the data staging to the PC or LAN level as possible. In addition, it is strengthening the mainframe data interfaces. Commander is considered a high-cost alternative, with systems often costing \$250,000 or more.
- **Market Approach** - Comshare is focused on the serious EIS customer who is ready for a *solution* sale. It has alliances with several professional services firms and accounting application vendors, and is prepared to provide full professional services support. Comshare is also venturing into the application/user-specific EIS area. Two new products, Commander HRM and Commander FDC, are designed to serve the human resources and financial reporting functions. These products further confirm that Commander/EIS and its competitors are tool kits with which to build applications. Comshare offers complete professional services, but appears to fall back on its professional services partners if the task is too large.



- **Comment** - One common criticism of Commander/EIS is that it is too structured and templated. However, this structure gives it an ease of use and quickness of design that is important in the EIS development cycle. Designing new user presentations and personalizing the EIS for each user is accomplished with reasonable effort, although the data provision process remains as challenging as with most products. Comshare is leading the way with a LAN version and will soon provide a Macintosh product.

c. Decision Technologies

- **Product** - Probus EIS is one of two tool kits actively marketed as EIS solutions on the Macintosh. Drawing on the Macintosh ease-of-use environment and an open-architecture approach to data access, Probus offers a Macintosh solution comparable to RediMaster. Probus is typically linked to a DSS product such as Express or System W, or a 4GL such as Focus. The 4GL serves as the primary data source using 4GL report generator to build files that are downloaded to Probus. The Macintosh-based Probus provides one developers' tool kit and unlimited runtime systems under a site license for \$45,000.
- **Market Approach** - Using a HyperCard-type design philosophy and other unique features of the Macintosh environment, Decision Technologies is appealing to the modest but growing preference for the Macintosh within large organizations. By concentrating on the user interface and not constructing major EIS data bases, Probus provides a fast, practical alternative. Decision Technologies is working to build alliances with professional services and other non-EIS software firms to increase its market exposure.
- **Comment** - The pluses of the Macintosh provide an entry directly to the user, but of course cause added concerns when IS becomes involved. And the work to source the required data for EIS remains a significant element of the development effort. Personal-computer-only vendors like Decision Technologies downplay the task of providing the data to the EIS presentation system, which is often the toughest challenge.

d. Execucom

- **Product** - Executive Edge™ is similar to Commander/EIS, but offers the advantages of its own relational DBMS, direct SQL access to numerous DBMSs, and greater flexibility in designing the user applications. It has fewer templates and greater design capabilities. The installed base is approaching 50, and the cost is similar to that of Commander/EIS and Command Center.



- **Market Approach** - Execucom has focused on the larger IS market and its existing IFPS installed base to gain a quick entry into the EIS market. Execucom's approach combines a fully integrated PC-based EIS interface to a proprietary DBMS with open-architecture access to SQL-based data bases, plus the integration of DSS capabilities. Execucom believes its EIS approach will spread quickly to all levels of management. It is building added PC capabilities to support the expected need for DSS-type applications by lower-level EIS users.
- **Comment** - A direct competitor to Comshare and Pilot, Execucom benefited from a later start, more experience with SQL and other data base technology, and PC experience with IFPS/PC. In addition, IFPS may operate in the greatest variety of computing environments. Executive Edge appears to be ahead of its direct competitors in the information pipeline and the incorporation of decision support capabilities. A new PC product is expected that will integrate with Executive Edge and provide the types of capabilities that middle management will want in EIS.

e. Holistic Systems

- **Product** - Holos is unique in that it is for the Digital Equipment VAX environment and can use either a PC or terminal interface. It was developed in the United Kingdom by individuals involved with decision support systems technology. Using SQL, the Holos EIS and DSS tools interface with existing production data bases. The price can exceed \$150,000 and includes several tools, including a 4GL and a modeling language.
- **Market Approach** - Focused on the Digital market and eventually UNIX, Holistic Systems is working to provide an information delivery capability integrating EIS and DSS and to supply a capability that can be used by all levels of management. This strategy gives it access to medium-to-large organizations and allows it to focus on a different market than most of the other EIS vendors.
- **Comment** - Holistic Systems has targeted a market that has been secondary to the main EIS vendors. It is one of the leaders in establishing a strong linkage to DSS capabilities, which is part of making EIS a tool for all levels of management. Given its midrange computer focus, Holistic Systems will quickly begin serving operating and middle management in large and medium-sized companies.

f. Information Builders Inc. (IBI)

- **Product** - Focus/EIS was announced in the U.S. market in June, 1990. Based on PC/Focus and a product marketed in Europe, it will provide the ability to build an EIS on top of an existing Focus environment.



Focus/EIS is expected to be competitively priced at about \$40,000 for ten users, including significant consulting support. If a company already has Focus, this product should be very attractive; if not, the total cost will approach that of the main competitors.

- **Market Approach** - IBI's entry into the EIS market is logical and overdue. As the most common 4GL/DBMS, Focus currently controls much of the management data in many large organizations. Given that Focus controls the data pipeline and has flexible access to all major DBMSs, it is a logical environment for EIS development. Some of the data provider problems may already be managed, many users are familiar with Focus, and PC/Focus is a proven product. IBI will certainly concentrate on the Focus installed base, including companies already using the established EIS products. First IBI will try to stop the spread of competing EIS in a Focus user site, then may try to take over.
- **Comment** - Until Focus/EIS can be evaluated, it is uncertain how complete a tool kit it is. However, given the size of the Focus installed base, it will be a tempting product. Current Focus users in the evaluation stage can be expected to try Focus/EIS, at least to start.

g. Information Resources Inc. (IRI)

- **Product** - Express/EIS, available in mid-1990, is a PC-based front end to Express, one of the commonly used DSS modeling languages. Express/EIS provides the integrated user interface and the typical development tools to build a complete EIS using Express as the data staging and analysis engine. The cost is high—exceeding \$100,000, if Express is not currently installed.
- **Market Approach** - IRI has been modestly active in the EIS market with Express and Express/PC. IRI's philosophy is based on the belief that a successful EIS is more than an information source for management and that EIS is for all levels of management. The addition of Express/EIS provides a tool kit and a set of templates to provide a full-featured EIS, including a decision support system. IRI will target larger organizations and, like Execucom, will start with the Express installed base.
- **Comment** - IRI is a late, but obvious, entry to the EIS market that should appeal to large organizations with a tradition of DSS activity. However, because of IRI's DSS orientation, it will have some difficulty competing where the sale is directly to the IS organization.



h. Interactive Images

- **Product** - The Manager's Portfolio™ (four predefined EIS applications in template form created in EASEL) has given Interactive Images a specific entry point to the corporate market. EASEL is a PC-based development environment that puts a PC front end on mainframe applications. It accesses data where they reside or directly in an RDBMS such as DB2. Priced on a per-user basis at \$7,500 per development system and \$350 (or less in volume) per runtime system, the initial cost is modest. Without the Manager's Portfolio, EASEL is an IS product that requires the skill of a trained systems analyst. Interactive Images has an EIS installed base of about 120.
- **Market Approach** - Interactive Images has used the EIS sector as an entry point for its generalized development capability. The goal is to put PC/graphical front ends on mainframe applications of all types; given the graphical orientation of EIS, this is a logical starting point. Over half of the EASEL users have applied its capabilities to EIS. Once EASEL is purchased for an EIS, expansion to traditional applications is likely. Interactive Images has a formal alliance with IBM, which helps market EASEL to major corporations.
- **Comment** - The Manager's Portfolio gives a quick start; however, the development of a full set of EIS applications is a significant task. EASEL is considered an IS product—not a tool easily adopted by users, even skilled users. Given the need to interact with a DB2 or other production data files, the data provision part of the system takes significant skill to use.

i. IBM

- **Product** - Executive Decision reached the market in late 1989 (a VM version with MVS is due in September, 1990). It is a full-featured product modeled after the leading PC-to-host EIS products, with some added features. Included are an integration of text and data, the use of IBM's Office Vision environment, and an emphasis on decision support. Executive Decision requires OS/2 Extended Edition and is expensive.
- **Market Approach** - IBM's focus is on very large customers committed to an Office Vision environment and to using Executive Decision capabilities at many levels in the organization. It expects to use this product to speed the evolution of SAA/cooperative processing environments in large sites.
- **Comment** - The emphasis is on supporting IBM's broader goals, not the quick-start prototyping philosophy that is supported by many other vendors.



j. Media Works

- **Product** - Executive Workstation is the second Macintosh alternative. Executive Workstation uses a HyperCard-type capability to provide most of the typical EIS applications (E-mail, news, briefing books, etc.). Data acquisition is from existing host data files using SQL or other query capabilities. The tool kit is \$50,000 and Media Works is prepared to provide consulting services.
- **Market Approach** - Using a HyperCard-type approach, Executive Workstation supports the prototype and learn-as-you-go philosophy that is more common in the EIS arena. Media Works' objective is an EIS environment that each user can enhance and personalize, gaining some independence from the IS infrastructure. Executive Workstation can be considered a work group computing capability and is expected to help push EIS-type capabilities down to lower management levels of organizations.
- **Comment** - The added strength of SQL query tools and the user comfort with the Macintosh give Executive Workstation an entry point in the user community.

k. Pilot Executive Software

- **Product** - Command Center was the first EIS application on the market in 1985. As the ground breaker, it created its own relational data base and PC interface, and forged a market concept based on a PC/host environment. Today, Command Center is expanding from its traditional architecture to include a LAN design and is enhancing its data pipeline capabilities.
- **Market Approach** - With the second largest installed base—over 150 sites—Pilot has remained focused on a single market sector until its recent partnership with Thorne. Pilot now markets FCS, a decision support system from Thorne, in the United States, and is broadening its focus to include decision support. Pilot concentrates on larger corporations and has a significant following where its data base architecture provides advantages such as security and multiple-entity data consolidation. Pilot, like Comshare, has an evolving professional services group and has numerous clients that have been supported by professional services companies.
- **Comment** - As the original EIS, and like Comshare, Pilot carries some baggage that hampers its growth. It is beginning to move away from a structured PC/host implementation. Pilot is responding to competition with a Macintosh front, a UNIX version of the host module and, most important, a LAN version. Pilot may suffer from being the first and, therefore, having more false starts or failures than the newer vendors, but it retains many strong supporters.



1. SAS Institute

- **Product** - SAS does not actively market an EIS tool kit but has numerous examples of EIS-type applications being built with SAS. The new Version 6 provides all the essentials except predefined EIS templates. The PC interface is ideal for briefing books and building graphical interfaces to other EIS-type applications. SAS includes the needed interfaces to SQL data bases for data acquisition.
- **Market Approach** - SAS Institute has typically not focused on particular application areas, choosing instead to strengthen its underlying tools. It promotes its strong analytical capabilities in all areas of end-user computing. Its strategy remains the same in the EIS arena, although the marketing manager INPUT interviewed described his personalized EIS installation as operating on a color terminal.
- **Comment** - It would seem that SAS Institute will need to do as Information Builders and other 4GL/DSS vendors have done and provide an EIS product to the market. Otherwise SAS will miss an opportunity to expose its technology to yet another set of users. In addition SAS will have to develop an EIS top-level environment within which the secondary EIS tools (calendar, notes, news services) can be integrated.

2. How Vendors Are Changing

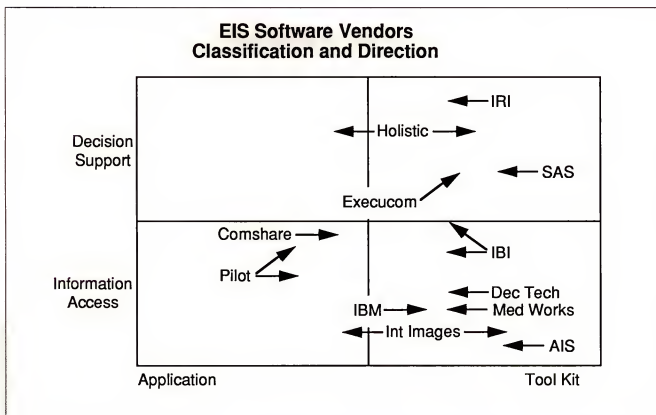
In Exhibit V-9, INPUT summarizes its characterization of the principal software vendors in the EIS market. First, they are classified by the application versus tool kit definition issue and by whether they have an information access or decision orientation. Second, their strategic direction is indicated by an arrow.

Although generalized, this characterization provides some added perspective on the direction of the market over the next few years.

- The early EIS vendors are pushing toward the tool kit perspective to broaden the market opportunity and add extra features, functions, and value.
- Pilot is adding DSS capabilities as well as pushing to a broader tool kit and platform orientation.
- The personal-computer-based vendors are using EIS to gain access to the corporate market with tool kits that can be used at any level of an organization to place PC-type interfaces on information sources. Interactive Images, with EASEL, has a two-level strategy (EIS and new interfaces to operational systems).



EXHIBIT V-9



- The newer 4GL/DSS entries (Information Builders, Information Resources) are using EIS as an opportunity to protect their installed base, add revenue from an additional product, and provide an alternative to acquiring another technology for end-user computing.

It is reasonable to presume that additional vendors will use EIS as a market entry strategy.

3. Summary

Exhibit V-10 summarizes this section on key vendors. There is a danger in describing a vendor's technology and strategy in a single term or phrase; however, a comparison provides a point of reference.

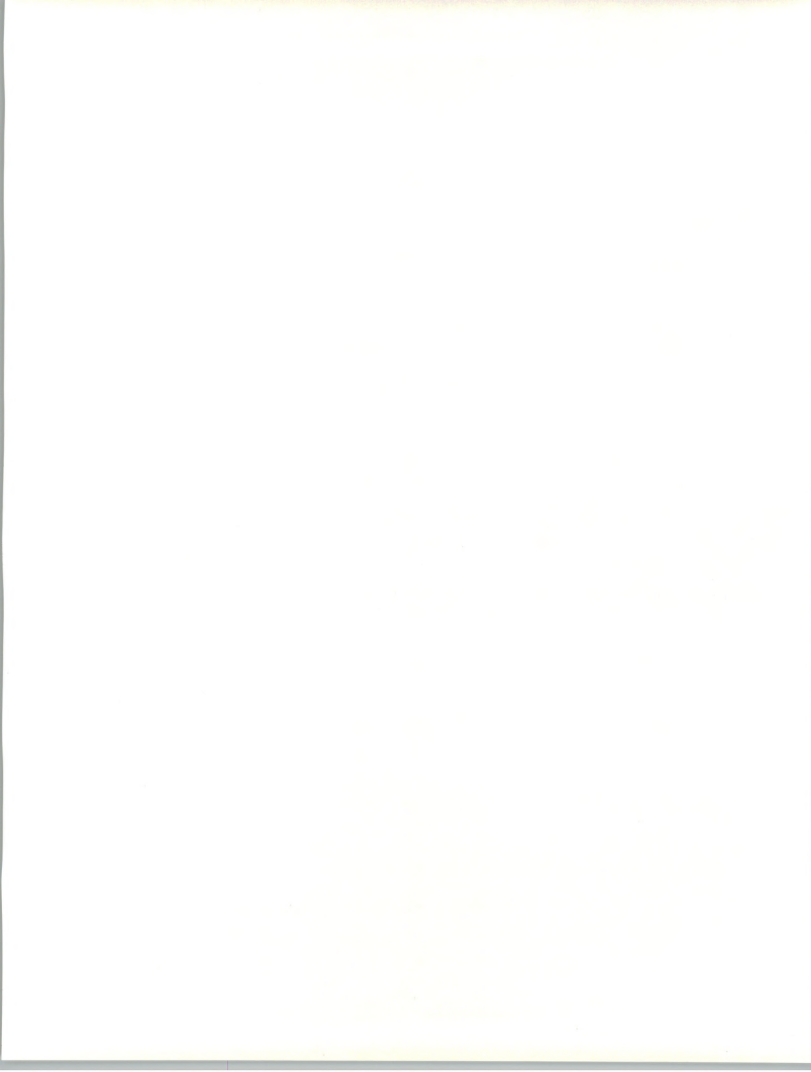


EXHIBIT V-10

EIS Key Vendors Summary

Company	Product	Price	Technology	Strategy
American Info. Sys.	Redimaster	Low	PC Only	EIS for any Size Firm
Comshare	Commander	High	Multiplatform	EIS for the Large Firm
Decision Technologies	Probus	Med	Macintosh Only	Integrated MAC Alternative
Execucom	Executive Edge	High	DSS Integration	EIS for the Large Firm
Holistic Systems	Holos	Med	VMS/UNIX	EIS for the Mid-Size Firm or Dept.
Information Builders	Focus/EIS	Med	PC Interface to Focus	Leverage Installed Base
Information Resources	Express/EIS	High	PC Interface to Express	Leverage DSS Business Base
Interactive Images	Manager's Portfolio	Med	PC Interface to Oper. Sys.	Entry to EASEL Sale
IBM	Executive Edge	High	OS/2-Office Vision	Integration of EIS
Media Works	Executive Workstation	Med	Macintosh Only	Integrated MAC Alternative
Pilot	Command Center		Multiplatform	Broaden Use in Large Firm
SAS Institute	No EIS Product	Med	Multiplatform	Do EIS with Regular SAS



C**The Changing Market**

Chapter III set the stage for this analysis of a changing and broadening market. Chapter IV described a young, but maturing user view of the EIS challenge, and so far Chapter V has characterized a market made up of a diverse, growing set of vendors. In this section we will first identify the key market issues and technical trends, and then consider those that are key competitive issues. All of this will provide a basis for the market forecast that follows in section D.

1. Market Issues

In Exhibit V-11, INPUT identifies the five most significant issues affecting the EIS market. Each has been commented on before and is further explained here.

- The growing number and type of software and professional services vendors active in the EIS market is a key cause of the overall change in the character of the market.
- The diverse types of software vendors each bring a different set of objectives. In general, the newer vendors are bringing less-precise solutions to the EIS challenge, which is speeding the move to the tool kit definition.
- As noted previously, the latest market entrants—Information Builders and IBM—have their own unique strategies that affect their approach to EIS.

EXHIBIT V-11**EIS Market Issues**

- More types of vendors
- Alliances—are they valuable?
- Role of professional services
- Broadening user population
- EIS market—losing its identity



- A growing number of alliances were reported during the vendor interview process. However, a closer look suggests that they may be more superficial than substantive. Many such alliances are with professional services firms that will show a preference for, but not a dedication to, another vendor's product.
 - Even IBM, with its longstanding alliance with Interactive Images (EASEL), has brought its own EIS product to market that does not use EASEL. It is designed to push Office Vision, a higher objective than PC interfaces to operational systems.
 - Comshare has several alliances, including two with accounting software firms (MSA, now DBS; and Ross Systems, a Digital Equipment platform company), IBM, and two professional services companies. Together they create an image of the EIS market leader broadening its sales exposure to the maximum.
 - Pilot Executive Software has formed an alliance of substance with Thorne of the U.K., which now owns 10% of Pilot. Pilot gets a DSS system to integrate, access to the Thorne U.S. and international installed base of FCS users, and a strong international sales arm. All of this should permit Pilot to broaden its market appeal beyond that of the EIS specialist.
- As the use of EIS spreads across industries and down the management ranks, the value of professional services involvement will change and decrease.
 - At present, EIS tool kit capabilities are new and different. There is a recognized learning curve for the end user and IS staffs. Thus, the professional services arm of the software vendor, along with the external consulting services arm, can bring experience-based training and advice.
 - Once internal skills are developed by end-user computing specialists, the ability to proceed in small steps, independent of the vendor community, will grow and become the preferred mode. As help was sought with the first relational data base applications, so will it initially be sought for EIS.
 - The availability of lower-cost software alternatives offers another deterrent to using outside consultants. The progressive IS leader will buy RediMaster and put the best information center consultant to work learning what it takes to design the end-user view of an EIS application before the senior executive sponsor starts asking for an EIS.



- INPUT found numerous instances, and definitive plans, within many companies for an expanding user population. Across and down the organization is the direction for everyone's information system. The impacts will include:
 - Increased emphasis on access to more timely data
 - Increased requirements for data analysis capabilities beyond predefined drill-downs
 - Use by a more experienced and demanding user who will use his/her EIS installation much more frequently than the executive—hourly versus daily
- As the use broadens and the vendor community grows, EIS as originally defined will begin to lose its identity as a system only for executives.
 - Already there are attempts to rename EIS *Everyone's Information Systems* or the even grander name *Business Intelligence Systems*. Perhaps the vendors need to recognize that they have created a new development tool kit and call it that. Then they can go back to building systems for executives.

2. Technology Trends

Also driving the EIS market are a number of technology trends listed in Exhibit V-12. They all add functional capability to existing EIS capabilities and further drive the technology to a fairly broad-based tool kit definition.

EXHIBIT V-12

EIS Technology Trends

- Expanding platforms and the LAN alternative
- Presentation versus analysis capabilities
- Direct data access
- Text and image processing capabilities
- Object-oriented computing



- The movement by the major vendors to provide their technology on several platforms—and in a variety of operating systems—will speed the opening of the market to all levels of management and more modestly-sized companies. Macintosh interfaces will be as common as IBM PC interfaces, LAN/server versions will be favored, and midrange host versions will be chosen by departmental and operating managers who already have a computer installed.
- INPUT believes that the preference for EIS installations will move quickly to LAN/server environments. These environments lower the overall cost, provide a separation from the operational systems environment, and more closely follow the direction of end-user computing in general. All the vendors will support LAN installations before the end of 1990.
- EIS information access, presentation, and decision support data analysis will merge. EIS technology will appeal only to middle management if they can combine it with spreadsheet mania. Ever-easier-to-use data import/export capabilities at the EIS workstation, as well as integrated, on-the-fly “what if” functions can be expected.
- The real heart of EIS technology has been its captive DBMS, where data is summarized, commented upon, and staged as information for the on-demand EIS query. That capability will remain important; however, the ease with which information can be directly accessed in other operational data bases and other EIS data bases will become of equal importance.
 - For many EIS applications, the right vendor will be the one with the most powerful and flexible data pipeline, not the specialized EIS data base.
 - This will open up the market to yet more vendors, giving broader EIS choices.
- The information needed by management is not always expressed in quantitative form. In addition, the movement to image storage and retrieval systems suggests that EIS technology must deal comfortably with text and image processing.
 - The existing HyperCard-based Macintosh EIS projects already provide elementary text and image capabilities. The others will have to follow suit.
 - The capabilities of object-oriented computing offer significant strengths to the EIS objective. Consider an object that receives data from the normal EIS update, does the analysis, and activates three other objects based on the results. One object sends an E-mail

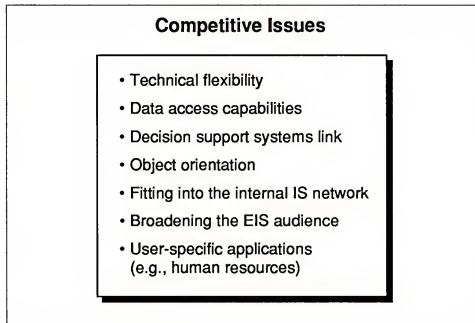


message with the analysis to two managers requesting explanation, the second checks all calendars and alerts the staff as to the time and date for a meeting to discuss the variances, and the third accesses a non-EIS data base to obtain additional detailed information. These capabilities should be available very soon.

3. Competitive Issues

The key competitive issues are identified in Exhibit V-13 and address the direction of the vendors and consequent exposures.

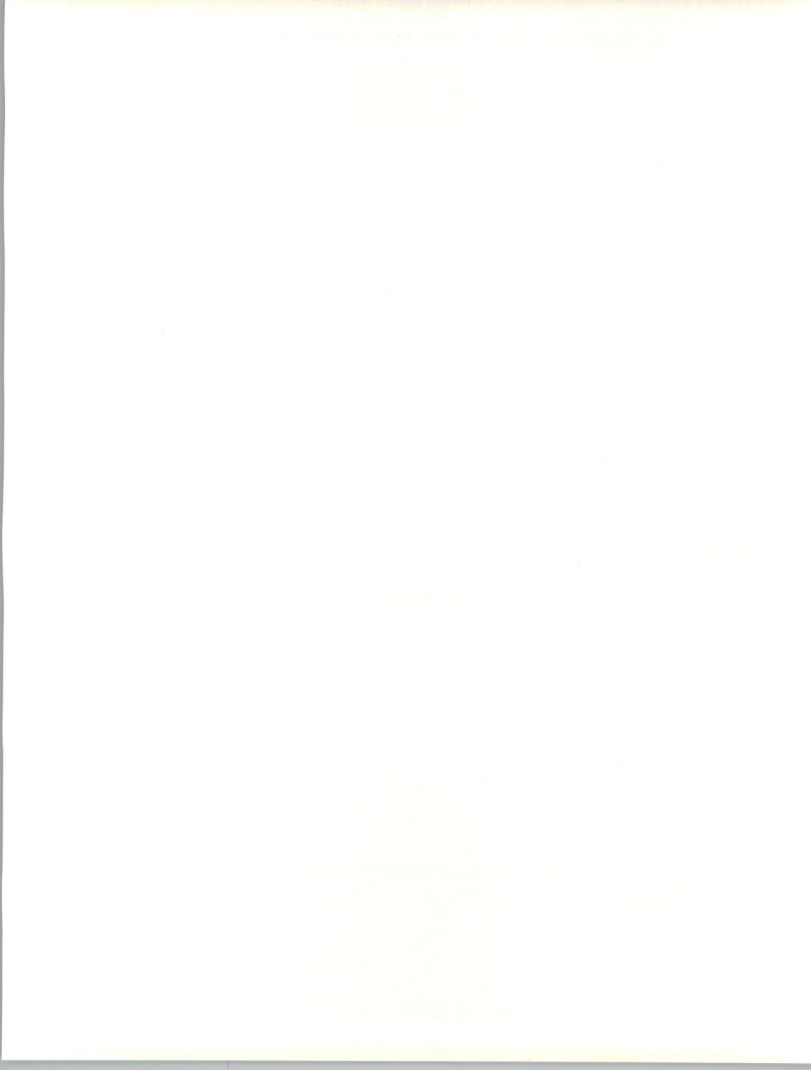
EXHIBIT V-13



- The pressure on the major vendors to compete on all fronts is causing significant development activity. Some vendors are equipped for a broad technical foundation, but others may not be so equipped.
- Comshare and Pilot are releasing Macintosh versions. If they are only clones of the PC version, they will not fare well in competition with the other Macintosh entries.
- Pilot is being forced to move to a LAN version and has entered the UNIX market with Hewlett-Packard.
- Only Execucom, which is used to the many versions of IFPS, may be equipped to deal with the technical broadening of the market to multiple platforms.



- Comshare has moved into function-specific applications with financial reporting and human-resource products. The new products will broaden Comshare's market share, but may confuse its overall EIS offering.
- As noted in the section on technical trends, the importance of data access capabilities is growing and will become even greater as use pushes down into the organization. The entry of Information Builders with Focus/EIS will create a formidable competitor even if the workstation segment of the product is weak. IBI understands and provides very flexible data access technology.
- The quick success of Executive Edge is due in part to Execucum's experience with and ability to interface directly with many, if not all, common data base technologies.
- The early success of the PC and Macintosh alternatives was because they leave the data extraction process to the local IS function. If the user has Focus or a comparable product, there is no debate on how the process should be done. All that is necessary is to build a Focus report file and download it (monthly, weekly, or daily).
- The decision support system factor will become of much greater importance, as previously noted. Most of the major vendors are reasonably well positioned to integrate this capability; however, they will have to do it at the workstation level to achieve real success.
- With few exceptions, the IS department is the buyer of EIS software. IS departments, of course, have the traditional concerns about integration, security, processing load, and more. The movement to a LAN/server platform will counter this concern to some degree, but IS will continue to set the rules for the data pipeline capability.
- The vendor that first incorporates the power of object-oriented computing can also differentiate its product line. Some of the capabilities conceivable with object-oriented processing are becoming available in accessing new external services. However, the real gain will be in expanding the analysis and action capabilities of EIS, thus moving them beyond informing into the action/implementation arena.
- The push to broaden the market by broadening the user audience creates conflict for the EIS software vendors of longer standing. They want to preach EIS use to the executive and keep the large ticket price, but do not want the PC alternatives to gain a foothold. They will have to create clear multilevel strategies and further product differentiation between EIS, the application and the EIS, and the development tool kit.



- Comshare has jumped out in front with function-specific EIS applications for financial reporting and human resources. It is too early to determine if this is a trend or just an opportunistic move. It does provide vendor differentiation and helps Comshare separate application from tool kit.

D

Market Forecast

In Chapter IV INPUT reported that the majority (55%) of the respondents had an active EIS program, with at least one installed application, or prototype and development activities. Another 23% have EIS under consideration for a 1991 decision, as shown in Exhibit IV-1.

Although the above percentages suggest a penetration level higher than INPUT believes exists within the Fortune 500 market, the data do confirm a high endorsement and significant movement toward the adoption of EIS tool kits.

In this section INPUT will look further at penetration and market share, and present a five-year forecast.

1. Market Share and Penetration

Exhibit V-14 presents INPUT's findings on the software being used by the respondents. There are two analyses provided.

- The first analysis includes all software and the use of general development tools to create an EIS.
 - The majority (59%) indicated they were using an EIS tool kit for their EIS development, while a somewhat surprising 41% used another technology (ranging from simple PC technology to main-frame development tools).
 - Note that 10% of the respondents indicated they were actively using more than one technology, often from more than one EIS vendor. Already users are finding there are uses and reasons for more than one EIS product. Perhaps the combination of a traditional product (Comshare or Pilot) and a PC or Macintosh workstation-only product will become common.
 - In addition, there were a few instances of a current effort to replace an initial EIS application using a newer EIS tool kit.
- The second comparison is between recognized EIS vendors mentioned by the respondents.



EXHIBIT V-14

Developing EIS Software Used

Vendor	Product	Percent of All Respondents	Percent of EIS Vendors
Comshare	Commander/EIS	27	46
Pilot Executive	Command Center	12	21
Interactive Images	EASEL	9	15
IBM	Executive Decisions	5	8
Media Works	Executive Workstation	4	6
American Info. Sys.	RediMaster	1	2
Execucom	Executive Edge	1	2
Other*		6	
Custom-Developed		35	

*Software products not commonly recognized as EIS tool kits

- As expected, Comshare and Pilot lead the installed base within INPUT's sample, with relative shares approximating their individual status in the U.S. market. Pilot's current share is certainly higher than the 21% indicated.
- Not all, but most of the vendors identified by INPUT are represented. Those not mentioned are Holistic Systems and Decision Technologies, both of whom are known to have a modest number of installations. In addition, Information Resources and Information Builders are just now releasing their EIS-specific tool kits.
- The interest in personal-computer-based tool kits is represented by the combined mention of Interactive Images, American Information Systems, and Media Works by 23% of the sample.
- Execucom is known to have a market share closer to 10% or 12%.



Market share and penetration levels are expected to change measurably over the next two to three years.

- Many users will go to multiple sites and probably more than one vendor's products.
- The new vendors will capture a reasonable share of the market. For example, it can be predicted that Information Builders will capture at least 5% of this expanding market by 1992.
- Penetration of the Fortune 500 market can be expected to approach 60% to 75% by 1992 or 1993.
- At the same time, the smaller company and departmental computing markets will begin to develop.

2. Market Forecast, 1990-1995

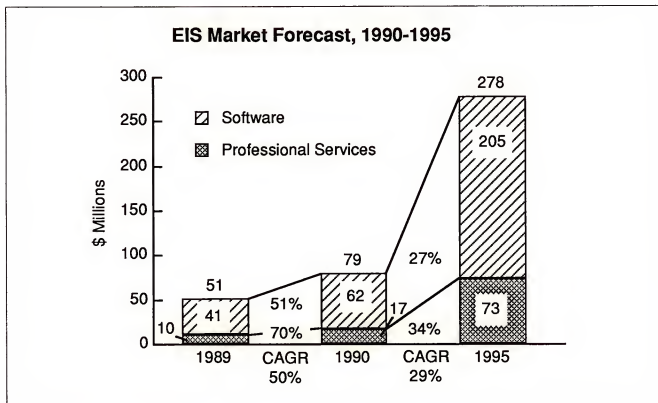
The forecast presented in Exhibit V-15 describes a market with strong growth exceeding, to a significant degree, that projected by INPUT for the general software and professional services markets.

- The forecast includes:
 - The U.S. market only
 - Software products sold under the name of Executive Information Systems by the vendors identified in this report
 - Professional services provided by software and professional services vendors and independent consultants in direct support of the design, development, and implementation of EIS applications
- The forecast does not include:
 - Software products sold in relation to the sale of an EIS tool kit—for example, Focus with Focus/EIS, or EASEL with Manager's Portfolio.
 - General application development software tools that may be acquired and used as an alternative to an EIS tool kit.
 - Professional services provided to create or enhance an operational system required by an EIS application, or provided in support of a more traditional decision support requirement.



Exhibit V-15 shows a software market growing over 50% in 1990, at a CAGR of 27% for 1990 to 1995, to reach a level of \$205 million. The related professional services market will grow to \$73 million over the same period, with a CAGR of 34%.

EXHIBIT V-15



- The 27% CAGR for EIS software compares to INPUT's current projections of 19% for application development tools and 24% for PC/workstation software.
- The 34% for EIS professional services compares to 18% for the consulting and 13% for the software development sectors of the total professional services delivery mode.
- EIS professional services revenues are projected to grow more quickly than EIS software revenues due to INPUT's belief that adopting EIS will impose a significant learning curve. A growing percentage of first-time buyers will, at a minimum, make use of software vendors' consulting services. However, this tendency will begin to decline by 1993 and the annual growth rates will become more equal.



3. Summary

Exhibit V-16 summarizes the key factors driving the EIS market at growth rates significantly higher than those of the software and professional service markets in general. All have been mentioned throughout this chapter.

- The EIS arena is viewed as an opportunity and a necessity for a variety of vendors, including:
 - Providers of 4GL and DBMS tools
 - Personal computer software vendors looking for another opportunity within the ever-growing corporate market
 - Professional services firms venturing into the software sector
- INPUT's findings suggest that the corporate market continues to have room to absorb significant additional EIS products.
 - A significant percentage of the larger organizations have not yet acquired EIS products.
 - Many will use more than one vendor's technology as EIS use expands to lower levels of management.
- The broadening vendor community and the entry of the PC and Macintosh vendors are driving the software entry price to \$50,000 and below for 10 to 20 users.

EXHIBIT V-16

EIS Market Forecast Key Factors

- Expanding vendor community
- Growing penetration within user community
- Decreasing entry price
- Expansion beyond the executive user market
- Expansion into medium-sized firms
- Blurring of the EIS identity



- In addition, the primary vendors are pushing their technology to the LAN/server level, which should lower the initial software costs.
- Lower price levels will simplify the decision to experiment with and test the technology, will make it easier for IS departments to become sponsors for EIS efforts, and will certainly increase the speed with which EIS-type applications spread throughout an organization.
- Experience has shown that EIS technology appeals to the executive; thus, it is safe to assume it will appeal to users at lower management levels who already have experience with computing.
 - As the capabilities of EIS environments expand in the decision support and data pipeline areas, EIS will be a much easier sell to middle management.
 - The movement toward LAN environments suggests that EIS technology will become a work group computing technology.
- Penetration into medium-sized organizations is occurring.
 - As the price declines and as companies—such as Holistic and Information Builders—that favor or are active in the midrange computer sector gain experience, this market will begin to grow appreciably.
 - In addition, the expected decrease in prices, the presence of personal-computer-oriented vendors, and the emphasis on LAN technology will make EIS an affordable technology for most companies.
 - The use of EIS technology by the medium-sized company will start with a broader user audience. To make the technology affordable, IS departments will spread EIS use to management in general, not just to executives.
 - INPUT believes the EIS products that provide the greatest decision support capabilities and that provide an affordable alternative will become favored in this market sector.
- To paraphrase one leading EIS vendor, “The EIS market as it is known today will become a small sector of the total EIS market in a few years.”
 - If this statement is true, will there be an EIS market or just an EIS application type used by IS departments to provide information to support management?



- If workstation-based graphical user interfaces become the standard for most interfaces to computing (operational as well as informational systems), this market and the products within it will be identified by a higher-level definition.





Conclusions and Recommendations







Conclusions and Recommendations

Conclusions and recommendations have been presented throughout this report. In this final chapter, conclusions are summarized and a final set of recommendations provided for users and vendors.

A Conclusions

The conclusions that follow generally apply to both users and vendors. They have been grouped under the headings of market, technology, use of technology, and the future. The conclusions are listed in Exhibit VI-1.

1. Market

Starting from an idea in 1985, EIS has developed into an established market, receiving significant industry attention. By breaking new ground, the initial EIS software developers and their early users have established the ability to strengthen a business through the use of computers that serve executives.

- The EIS pioneers have proven to a number of software vendors that EIS development is a real and significant opportunity. The pioneers' success has created competition and attracted a vendor community with a broad set of technological orientations. This success has also created an opportunity for professional services firms to build a business out of a software market.
- The EIS vendor community is growing very quickly. It is attractive to PC-oriented startups and a wide variety of established mainframe/midrange developers of end-user computing tools. The market is likely to attract other firms from the relational data base sector. Any vendor that wants to support cooperative processing application development should find EIS of value and a potential starting point.



EXHIBIT VI-1

Conclusions

Market	<ul style="list-style-type: none">• EIS has become an established market.• The vendors have diverse backgrounds.• Market moving beyond executive user.• Market definition broadening.
Technology	<ul style="list-style-type: none">• EIS setting example for cooperative processing applications.• A tool kit, not an application.• EIS technology will be a strong user of LANs.• Other development technologies can learn from EIS.
Application of Technology	<ul style="list-style-type: none">• Differs from traditional development.• Value can be gained at all management levels.• Creates a strong link between user and IS.• EIS projects are built a piece at a time.
The Future	<ul style="list-style-type: none">• More vendors will participate.• Tool kit capabilities will continue to grow.• EIS will be absorbed by a broader software market.

- The market focus has begun to expand beyond the executive user. Success of any information technology has resulted in expanded use, and EIS is no different. If EIS can make a senior executive more effective, then that executive wants EIS to make other levels of man-



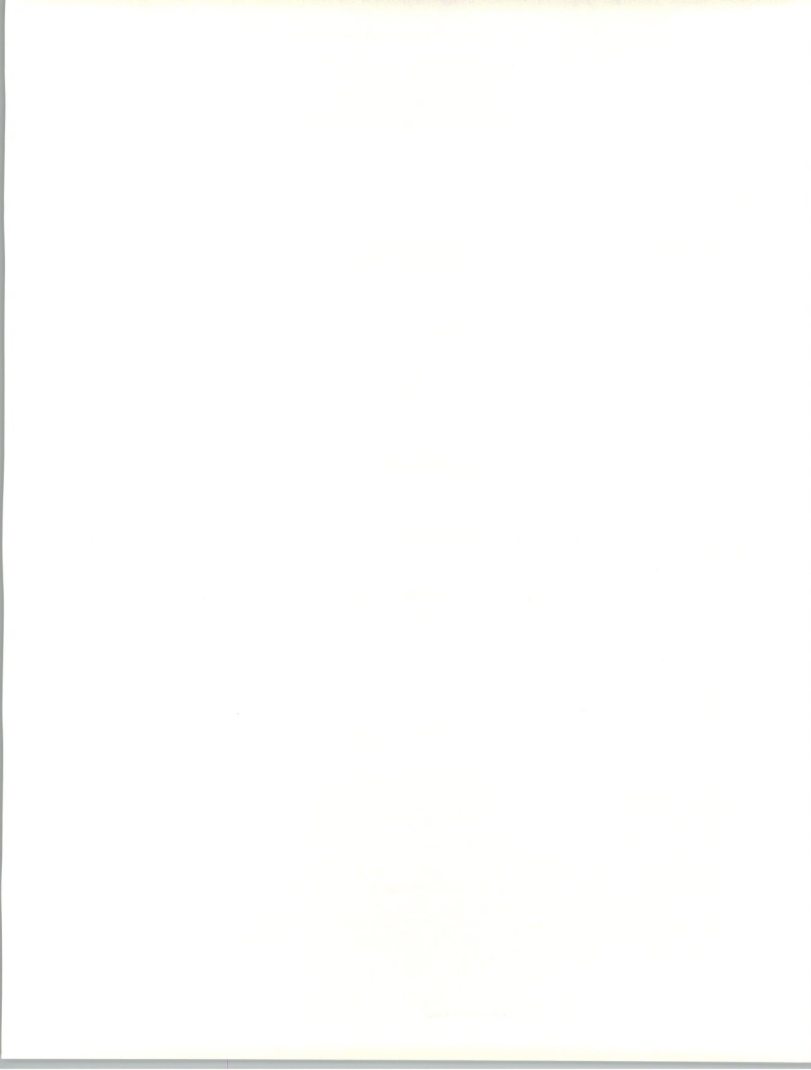
agement more effective. As the EIS-type user interface and power spreads to middle management over the next two to five years, it will significantly change the character of the traditional application system.

- Of necessity, the market definition for EIS is broadening. The additional vendors and their specific strategies, the need to maintain growth, the logical interest in a wider user audience, and expansion of the software capabilities are all factors. The concern of the primary vendors whose EIS strategy is one and the same with the company's strategy will be that the general market definition does not stray too far from their own definition.

2. Technology

Earlier in the report INPUT described at some length how EIS was breaking new ground in a number of software areas and that EIS had multiple definitions. The key conclusion that information systems personnel should draw from their initial experience with EIS software technology is that there is much to learn and much to gain.

- Cooperative processing is destined to be a key application architecture of the 1990s. The existing EIS technology utilizes this concept; thus, those who make progress with EIS will have a head start.
- It is paramount that the EIS journey is started with an understanding of what the software tool is and is not. Essentially every EIS software product available in 1990 is a tool kit, not an application. It is true that the tool kit is designed with the underlying components (subapplications) of the typical EIS installation in mind, but what one buys is the starting point, not an application that is installed and then customized with a modest investment.
- The shift of the EIS technology to LANs/servers is well underway. LANs/servers will be the predominant installation environment by 1991, which will help speed the adoption of EIS computing at all management levels. The LAN focus will lower cost, simplify installation, and permit the user to have more control over the application.
- It is important that other development technologies, including relational data base management systems, new generations of 4GLs, and any PC software used to interface with a traditional information network observe and monitor EIS developments. Much is being learned about creating user environments that can orchestrate multiple subapplications while providing an environment that is personalized to the individual user.



3. Application of EIS Technology

Industry has five years of experience with EIS software. INPUT found that over half of the organizations surveyed have an active EIS program in 1990, with over one-third already claiming an installed EIS. From this experience, a few critical conclusions are drawn.

- EIS technology differs in numerous ways from traditional application systems and their development. Drawing on the end-user computing experiences of the 1980s, EIS technology provides the capability to truly add value to all of the data acquired by existing operational systems. The development process is best taken in small steps, will be prone to numerous changes along the way, and may be considered a journey and an adventure.
- The values gained by the early EIS users have indicated that a successful EIS project serves more than the top executive(s). To work, it must also serve the information provider, which introduces it into upper middle management. It then will become pervasive within management and among professionals at all levels and within all functions. There is no reason that EIS-type information services should not be developed for all management, in support of the objective of improved management effectiveness and organizational competitiveness.
- Once end users learned 4GL and PC technology, they began to search for ways to access operating data bases. End users could develop the analysis program by themselves, but they still couldn't get the data without IS help. EIS solves this problem. IS must be involved and the data pipeline capabilities of EIS products are a major step in linking the user with the whole information network.

4. The Future

The next five years will bring many changes to the EIS market. It is likely that EIS will undergo additional changes in definition and may even vanish as a unique software product.

- As the definition has broadened, the vendor community has grown from two to a dozen. Certainly more vendors exist, but do not identify their products as EIS. There is every reason to believe the number will grow further. EIS will prove to be one way for a development tool kit builder to introduce cooperative processing capabilities and attract market attention.
- Because the definition of an EIS is somewhat loose, each new and existing vendor has the opportunity to add new capabilities or subapplications to gain product differentiation. With stronger competition, the breadth of the EIS definition will continue to expand to



decision support, object-oriented computing capabilities, and more. Further blurring of the definition will result, requiring buyers to more carefully plot a course for the EIS journey.

- The current direction will most likely lead to EIS's reassuming the application definition, even reverting to mean the information access and analysis capabilities where it started. The EIS tool kit products will become part of a larger cooperative, graphical interface development tools market. EIS technology does not have to include E-mail or external news service modules. If these are needed, they can be provided through a software product other than the EIS tool kit.

If there is a single conclusion about the first five years of EIS, it is that it has taught users and IS departments how value can be gained from today's and tomorrow's workstation-based computing capabilities.

B

Recommendations

Based on the research and findings presented in this report, INPUT offers the following recommendations, shown in Exhibit VI-2.

1. For Users

- *Start The EIS Journey*—If you have not started it, do so quickly. Although INPUT found a majority had already started EIS programs, those who haven't need to be encouraged to start. The EIS experience brings value to the organization as a whole and to the information systems function. It is representative of what will become typical for applications systems in the 1990s.
- *IS Leads the Way*—There is enough experience and variety of products that IS departments should be prepared to steer the course of the EIS journey. True, users must want EIS, but IS can market it. And since EIS concepts are now being applied at lower levels of management, IS can reduce the risk by working with a user group that has the confidence in its ability to gain value from additional computing technology.
- *Use EIS to Strengthen Applications in General*—It is essential that IS recognize that underlying EIS is cooperative processing technology, the ability to change the face of many aspects of the information network, and the means to increase the value provided by the informational computing investment. IS departments need to apply EIS concepts of workstation-based processing and graphical information representation to other application areas.



EXHIBIT VI-2

Recommendations*For Users*

1. Start the EIS journey if it is not underway.
2. IS should assume the leadership and seek sponsors.
3. Recognize that underlying EIS is an information technology of broad value.
4. Understand there is much to be learned during the EIS journey.
5. EIS technology is different; be willing to ask for assistance.
6. Set a flexible overall course for EIS development.

For Vendors

1. Clarify the EIS definition issue.
2. Increase emphasis on the data pipeline capabilities.
3. Expand consulting services support.
4. Prepare to deliver EIS applications.



- *Learn from the EIS Experience*—EIS technology is a groundbreaking use of information technology; thus, there is much to learn from the initial experience. Therefore, IS departments should staff the effort with their most creative people. EIS is also a strong link to end-user computing.
- *Ask for Assistance*—If EIS differs from other business uses of information technology, then it makes sense to ask for the help of those who have experience. Just as corporations have gone outside to find information and relational data base specialists, it is appropriate to look for an EIS specialist, and to be prepared to seek consulting assistance from the vendor community.
- *Set a Course*—Every journey needs to have a course. EIS use, though characterized as a journey without end, still needs a course that maps the general use of the technology within the organization, looks for and sets standards, tracks the evolving technology, and monitors the successes and failures. Setting a course is an IS responsibility that must be part of IS's overall end-user computing program.

2. For Vendors

- *Clarify the Definition*—Progress is being made, but vendors can benefit from a clearer representation of what they sell and what can be built with what they sell. To capture the attention of the middle management and departmental market for EIS technology, clarity will be required. It may become necessary to change the name of the EIS development tool kit to something else to broaden the appeal to IS departments and users at all levels.
- *Improve Data Pipeline Capabilities*—As companies like Information Builders and Execucom enter the EIS market, they bring proven data base interface capabilities. It is essential that other vendors increase their capabilities and flexibilities in this area, in particular to be more attractive at lower levels in the organization where the EIS data base may already exist as part of the department's existing information system.
- *Provide More Consulting Services*—Most software vendors offer consulting services, but they favor the technical tasks, which are really the easier tasks. If the major professional services firms can develop the skills, so can the software vendors. EIS technology is pushing a revolution in application interface and cooperative processing concepts. EIS started the process of using graphical interfaces on large applications and has much to teach those in the application development arena.



C

Closing Thoughts

- *Deliver EIS Applications*—Market share can be gained by a software vendor marketing function or industry-specific EIS products. Comshare has demonstrated this with its human resources and financial reporting products. The products' acceptance indicates that there is a market for true applications, aside from the EIS tool kit. Such products should shorten the learning curve and, if priced competitively, speed the use of EIS technology in divisions and medium-sized companies where IS resources are often scarce.

The EIS market is established, the technology has a growing following in the IS and end-user communities, and much is being learned about putting a new face on the information asset of the organization. This modest market is a first wave in an information technology revolution that will last well into the 1990s.

EIS combines the power of workstations and servers, teaches cooperative processing approaches by example, and contributes directly to the business management style of the 1990s. It should be used by management at all levels to improve effectiveness.



Appendixes

1





Appendix: Executive Information Systems—User Questionnaire

The application of information systems technology for use by executives using personal computers and background databases has been developing for the past few years. Progress has been marked with success and many false starts.

INPUT in cooperation with POSPP and ICI is taking an in depth look at the Executive Information Systems (EIS) arena to determine its state of maturity, current underlying trends, the direction of key vendors and what the next few years will bring. Your response to the following questionnaire will provide the foundation for this research.

INPUT will be presenting the results of its full EIS research efforts at a future meeting to which you will be invited. Your participation is greatly appreciated. Please mail your completed questionnaire to:

Atten: Ellen Snoyer, POSPP, 3230 Commander Dr., Carrollton, TX 75006

Demographics

1. What is your position/title? _____

2. In which of the following industries is your organization?

- | | |
|---|--|
| <input type="checkbox"/> Discrete Manufacturing | <input type="checkbox"/> Insurance |
| <input type="checkbox"/> Process Manufacturing | <input type="checkbox"/> Medical |
| <input type="checkbox"/> Transportation | <input type="checkbox"/> Education |
| <input type="checkbox"/> Utilities | <input type="checkbox"/> Services |
| <input type="checkbox"/> Telecommunications | <input type="checkbox"/> Federal Government |
| <input type="checkbox"/> Retail Distribution | <input type="checkbox"/> State & Local Gov't |
| <input type="checkbox"/> Wholesale Distribution | <input type="checkbox"/> Consumer & Home |
| <input type="checkbox"/> Banking & Finance | <input type="checkbox"/> Other (Specify) |



3. What is the size of your organization?

a. Revenue

- ☐ Over \$1 Billion
☐ Over \$1 Billion
☐ Over \$500 Million
☐ Over \$100 Million
☐ Over \$50 Million
☐ Under \$50 Million

b. Number of Employees

- ☐ Over 10,000
☐ Over 5,000
☐ Over 1,000
☐ Over 500
☐ Under 500

4. What is the size of your Information Systems budget?

- ☐ Over \$ 500 Million
☐ Over \$ 100 Million
☐ Over \$ 50 Million
☐ Over \$ 10 Million
☐ Over \$ 5 Million
☐ Under \$ 5 Million

EIS Activity

5. In what stage of development is your EIS systems activity?

a. Status?

- ☐ Installed
☐ Prototype
☐ Under development
☐ Planned for development in 1990
☐ Under consideration
☐ Not being considered

b. If not being considered, why not?

- ☐ No Sponsor
☐ Lack of Finances
☐ Legal concerns
☐ Security concerns
☐ Not supportive of the technology
☐ Other (Specify) _____

6. If you have an EIS installed:

- a. When was it first installed? Month ____ Year ____
 b. When did the development start? Month ____ Year ____
 c. How many separate EIS systems are there? ____
 d. Where are the EIS systems active or planned?

EIS ApplicationActive
Planned by
End 1990
Planned by
End 1991

Corporate Execs
 Finance
 Accounting
 Marketing
 Regional Offices
 Personnel



Operations	_____	_____	_____
Engineering	_____	_____	_____
Other (Specify	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

e. How many users are there now and planned?

<u>No. of Users</u>	<u>Now</u>	<u>Planned by End 1990</u>	<u>Planned by End 1991</u>
Over 100	_____	_____	_____
Over 50	_____	_____	_____
Over 25	_____	_____	_____
Over 10	_____	_____	_____
Under 10	_____	_____	_____

f. Has one or more EIS applications been dropped/abandoned?

Yes _____ No _____

g. If abandoned why? _____

h. At what stage was it abandoned? _____

7. If an EIS is under development:

a. When will it first be implemented? Month _____ Year _____

b. When did development first start? Month _____ Year _____

8. Who are the primary users? (More than one answer acceptable)

a. Type

____ President & Staff
 ____ Division Heads
 ____ Department Heads
 ____ Analysts
 ____ Other (Specify)

b. Functional Area

____ Finance
 ____ Accounting
 ____ Personal
 ____ Marketing/Sales
 ____ Operations
 ____ Engineering
 ____ Other (Specify)



Type of EIS

9. What EIS Software are you using?

- | | |
|--|--|
| <input type="checkbox"/> Comshare (Commander/EIS) | <input type="checkbox"/> Pilot (Command Center) |
| <input type="checkbox"/> Interactive Images (Easel) | <input type="checkbox"/> Execucom (Executive Edge) |
| <input type="checkbox"/> Holistic Systems (Holos) | <input type="checkbox"/> IBM (Executive Decisions) |
| <input type="checkbox"/> Design Technologies (Probis EIS) | <input type="checkbox"/> Media Works (Executive Workstation) |
| <input type="checkbox"/> American Information Systems (RediMaster) | <input type="checkbox"/> Information Resources (Express) |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Custom Developed (Specify Tools) |

10. What hardware is used for your EIS?

- | | |
|--|--|
| a. Workstation | b. Network and Server |
| <input type="checkbox"/> PC | <input type="checkbox"/> LAN and Server |
| <input type="checkbox"/> Macintosh | <input type="checkbox"/> Mini |
| <input type="checkbox"/> Terminal | <input type="checkbox"/> Mainframe |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |

c. Did the EIS require new hardware capabilities?

Yes ☐ No ☐ Describe _____

11. Which of the following applications are active or planned?

<u>Application</u>	<u>Active</u>	<u>Planned in 1990</u>	<u>Planned in 1991</u>
Board Material	_____	_____	_____
Monthly Reports	_____	_____	_____
Weekly Reports	_____	_____	_____
Daily Reports	_____	_____	_____
Mail	_____	_____	_____
Calendar	_____	_____	_____
Notes, To Do Lists	_____	_____	_____
External News Service	_____	_____	_____
Other (Specify)	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



12. What categories of internal data are included?

<u>Category of Data</u>	<u>Now</u>	<u>Planned End 1990</u>	<u>Planned End 1991</u>
Financial	___	___	___
Accounting	___	___	___
Marketing/Sales	___	___	___
Operating	___	___	___
Personnel	___	___	___
Engineering	___	___	___
Other (Specify)	___	___	___
_____	___	___	___
_____	___	___	___

EIS Development

13. Who was the initial sponsor?

- ___ President
 ___ Member of President Staff (Specify) _____
 ___ Division Head (Specify) _____
 ___ Information Systems
 ___ Other (Specify) _____

14. What were the three (3) primary goals of the original sponsor?

- a. _____
 b. _____
 c. _____

15. Who was the project leader for the first EIS implementation?

- ___ User (Specify) _____
 ___ IS Group (Specify) _____

16. What is the level of IS support?

- a. Who is responsible EIS support?
 ___ Information Center
 ___ Corporate IS
 ___ Division IS
 ___ User IS Group (Specify) _____
 ___ Other IS Group (Specify) _____
 ___ User (Specify) _____

- b. How large is the support staff? _____



17. What is the estimated cost of your EIS for:

a. Initial Investment?

Category	(\$000)
Software	_____
Hardware	_____
Consultants	_____
Internal Staff	_____
Other	_____
TOTAL	_____

b. Ongoing Support(1990 Budget)

Category	(\$000)
Software	_____
Hardware	_____
Consultants	_____
Internal Staff	_____
Other	_____
TOTAL	_____

18. What role did external consultants play?

a. Were they used? Yes _____ No _____

b. If used which tasks did they perform?

____ Executive Interviews	____ Development
____ Initial Specification	____ Implementation
____ Prototype	____ On-going Support
____ Software/Hardware Selection	

c. What type of external firm was used?

____ Software Vendor	____ Other Professional Services Company
____ Hardware Vendor	____ Independent Consultant
____ Major Accounting Firm	____ Other (Specify) _____
____ Systems Integrator	

d. What is the name of the firm? _____

19. How would each of the following individuals or groups evaluate the performance of your EIS?

Category	Low		Med		High
(1)	(2)	(3)	(4)	(5)	
Original Sponsor	_____	_____	_____	_____	_____
President & Staff	_____	_____	_____	_____	_____
Division Heads	_____	_____	_____	_____	_____
IS Executive	_____	_____	_____	_____	_____
IS Support Group	_____	_____	_____	_____	_____

PLEASE RETURN QUESTIONNAIRE BY 5/1/90
THANK YOU!



B

Appendix: Executive Information Systems—Vendor Questionnaire

Vendor: _____

Type: Software or Professional Svcs.

Name: _____

Title: _____

1. How does your company define EIS:

a. What is the objective of an EIS?

b. Are the products tools or an application system?

c. Who is the customer: executives, IS, operating managers or other?

2. Does your company have an EIS “philosophy”?

a. Yes ___ No ___

b. Describe it.



3. What are the driving forces behind EIS?

a. Vendor View?

b. User View?

c. Are EISs executive-driven? Yes___ No ___

d. If yes, what percent are executive-driven? ___%

4. How will the EIS market change over the next 3 years?

5. What is the typical sales cycle?

a. Initial contact point? _____

b. Length of cycle? _____

c. Who makes tool selection? _____

d. If IS selects the tools, how much is the user involved?

Who is that user? _____

6. What is the typical time to install a first EIS?

a. Prototype? _____

b. First system? _____



7. How often do your customers have a false start?

a. False start? ____%

b. Failure? ____%

8. Please describe your product.

a. Name _____ Version No. _____

b. When was it first released? _____

c. Underlying technology/concepts? _____

d. How does your product interface to operational systems?

e. How has your product changed over time?

f. How will your product change in the future?

g. What platforms are available?

Workstation

Data base/Server

h. Installed Base? ____

i. Pricing and components?

j. Size of sale?

____Small ____Average ____Large



9. Do you offer professional services (if a software company)?

a. Yes _____ No _____

b. Please describe.

10. How large is the U.S. EIS market?

<u>Category</u> (\$000)	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Total Revenue				
Products	_____	_____	_____	_____
Prof. Svcs.	_____	_____	_____	_____
Growth Rate	_____	_____	_____	_____

11. What is the revenue of your company in total and for EIS?

<u>Category</u> (\$000)	<u>1988</u>	<u>1989</u>	<u>1990</u>
Total Revenue			
Products	_____	_____	_____
Prof. Svcs.	_____	_____	_____
EIS			
Products	_____	_____	_____
Prof. Svcs.	_____	_____	_____

12. How often are professional services involved in an EIS project?

a. Yours

b. Others

c. What other companies are used?



13. How often are professional services used in these stages?

<u>Stage/Task</u>	<u>Percent Used</u>
Executive interviews	_____
Initial specification	_____
Prototype	_____
Software/hardware selection	_____
Development	_____
Implementation	_____
Ongoing support	_____
Other (Specify _____)	_____

14. Do you have any EIS marketing alliances?

a. Yes ____ No ____

- b. Professional services firms (specify)?

- c. Software firms (specify)?

- d. How important are these alliances?

- e. What other alliances are planned?



15. Who are your competitors and how do you sell against them?

a. Primary

b. Secondary

16. Would you give some client references?

<u>Company</u>	<u>Name</u>	<u>Telephone</u>
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Appendix: Vendors Interviewed

Company	Type
American Information Systems	Software
Andersen Consulting	Professional Services
Booz Allen, Hamilton	Professional Services
Comshare, Inc.	Software
Decision Technologies, Inc.	Software
Execucom	Software
EXIS (Subsidiary of Peat Marwick)	Professional Services
Holistic Systems	Software
Information Builders, Inc.	Software
Information Resources, Inc.	Software
Interactive Images, Inc.	Software
IBM	Software
Media Works	Software
Price Waterhouse	Professional Services
Pilot Executive Software	Software
SAS Institute	Software

